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ABSTRACT

This document is a curriculum guide for a 4-year articulated engineering technology program created by the Heart of Ohio Tech Prep Consortium. The program covers the last 2 years of high school and a two-year college technical degree. The guide begins with a map of the program and includes the following sections: (1) secondary and postsecondary curriculum pathways and narratives; (2) secondary technical competencies (unleveled); (3) secondary academic competencies (unleveled); (4) secondary competencies (leveled per school); (5) postsecondary competencies; (6) advisory and review committee members; and (7) program application. Courses, competencies, and content are described throughout the guide. (KC)

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HEART of OHIO TECH PREP CONSORTIUM

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ED 427 150

EngineeringTechnologies Core Model

Approved, Consortium Board of Directors, 1997

- Secondary & Postsecondary Curriculum Pathways & Narratives
- Secondary Technical Competencies (Unleveled)
- Secondary Academic Competencies - Unleveled
- Secondary Competencies - Leveled per School
- Postsecondary Competencies
- Advisory/Review Committee Members
- Program Application

Heart of Ohio Tech Prep Consortium

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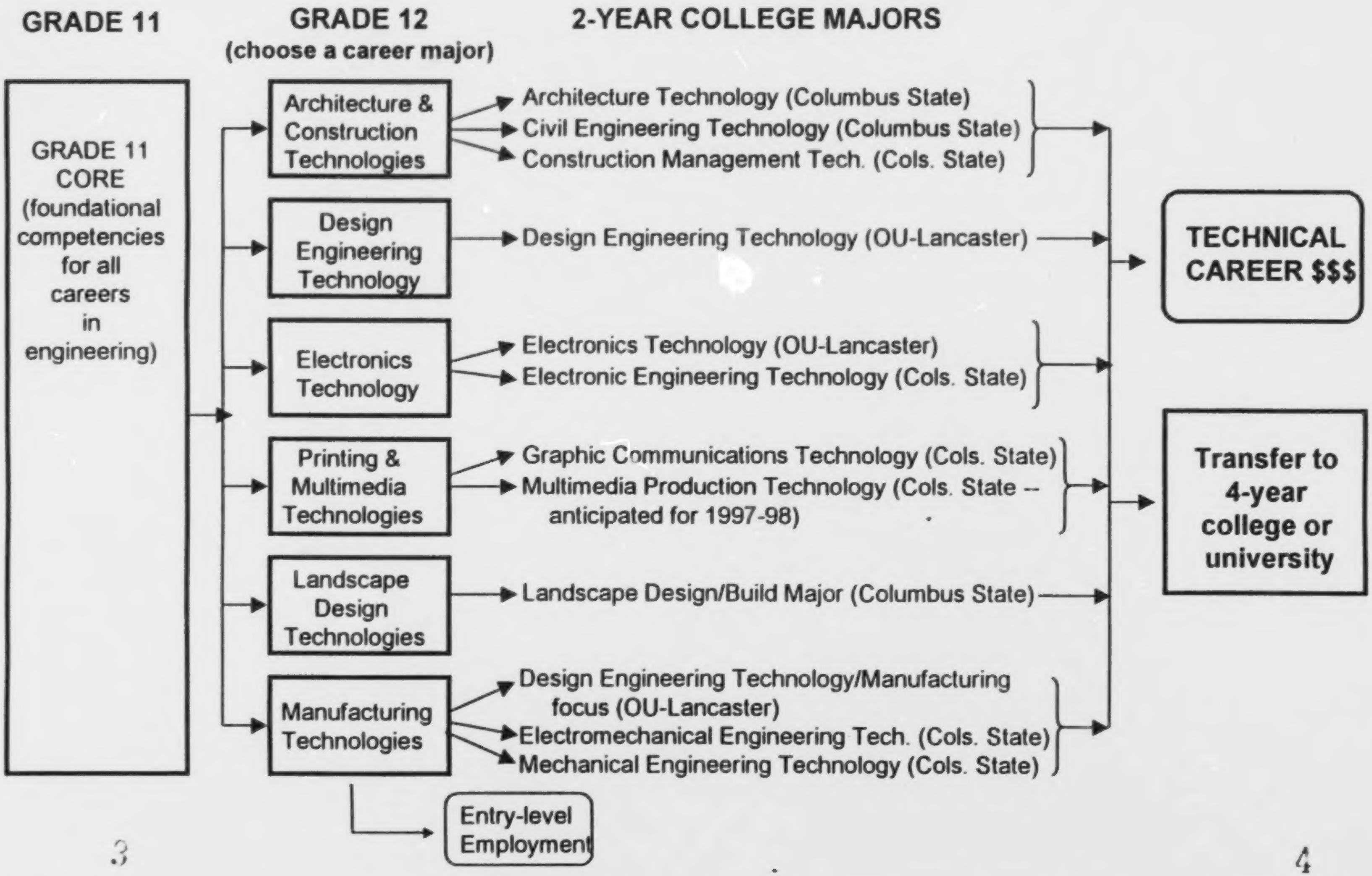
Heart of Ohio Tech Prep Consortium

MAP of ENGINEERING TECHNOLOGIES CORE Tech Prep Program (12/97)



GRADE 11

GRADE 12
(choose a career major)

2-YEAR COLLEGE MAJORS

GRADE 11 CORE (foundational competencies for all careers in engineering)

Architecture & Construction Technologies
- Architecture Technology (Columbus State)
- Civil Engineering Technology (Columbus State)
- Construction Management Tech. (Cols. State)

Design Engineering Technology
- Design Engineering Technology (OU-Lancaster)

Electronics Technology
- Electronics Technology (OU-Lancaster)
- Electronic Engineering Technology (Cols. State)

Printing & Multimedia Technologies
- Graphic Communications Technology (Cols. State)
- Multimedia Production Technology (Cols. State -- anticipated for 1997-98)

Landscape Design Technologies
- Landscape Design/Build Major (Columbus State)

Manufacturing Technologies
- Design Engineering Technology/Manufacturing focus (OU-Lancaster)
- Electromechanical Engineering Tech. (Cols. State)
- Mechanical Engineering Technology (Cols. State)

Entry-level Employment

TECHNICAL CAREER $$$

Transfer to 4-year college or university

HEART of OHIO TECH PREP CONSORTIUM
1997

Engineering Technologies Core Model

PART I.A:
Secondary Curriculum Pathways and Narratives

Westerville Schools
Westerville South High School

1997

Engineering Core/
Mechanical/Manufacturing
Engineering Technology

Heart of Ohio Tech Prep Consortium

9th Grade	Min.	10th Grade	Min.	11th Grade	Min	12th Grade	Min
TP Career Focus	50	Exploratory Computer Applications	50	TP Engineering Core Mechanical/ Manufacturing	150	Social Studies	50
TP High Tech Career Systems/ Keyboarding	50	TP High Tech Career Systems II	50	Algebra II/Geometry		Algebra III/FST/College Prep	50
						Applied Language Arts/English 12	50
English 9	50	English 10	50	TP Mentorship	50	TP Engineering Core Mechanical/ Manufacturing Physics	150
Phy. Ed./Social Studies	50	Social Studies/Fine Arts	50	English 11	50		
Algebra 1/Integrated 1	50	Geometry/Integrated II	50	Social Studies	50		
Science	50	Elective	50	Chemistry	50		

Prerequisites for Grade 11 of Tech Prep: Passage of all parts of 9th grade proficiency test, Algebra I.

Prerequisites for college port of Tech Prep: Articulation or proficiency testing will determine where students place into the program.

Suggested Electives: Photography (fine arts).

Explanation of Tech Prep Blocks: Students will be enrolled in a 150 min. Tech Prep block that will include one academic (science). Grade 11 integrates occupational, employability skills with Geometry. Grade 12 integrates occupational, employability skills with Physics. Other college prep academics will be taught outside the block. Students should complete Algebra II or equilivant.

High School Exit Occupations: Assembly technician, beginning drafter, CAD operator, production expediting clerk, machine operator, precision assembler, maintenance repairer, electrical/electronic, assembler, drafting technician, entry level machinist, and materials handler.

College Exit Occupations: (Based on AAS in Electronic, Mechanical or Electro-Mechanical Engineering Technology) mechanical engineering technician, CAD operator, material technologist, robotics technician, drafter-designer maintenance technician or supervisor, machine programmer, machine shop supervisor, industrial engineering technician, electronics service technician, test technician, machine designer, quality machine designer, quality controller, industrial supervisor, production scheduler, and production engineer technician.

Westerville Schools
Westerville South High School

1997

Engineering Core/
Landscape/Design Build
Engineering Technology

Heart of Ohio Tech Prep Consortium

9th Grade	Min.	10th Grade	Min.	11th Grade	Min	12th Grade	Min
TP Career Focus	50	Exploratory Computer Applications	50	TP Engineering Core Landscape/Design Build Algebra II/Geometry	150	Social Studies	50
TP High Tech Career Systems/ Keyboarding	50	TP High Tech Career Systems II	50			Algebra III/FST/College Prep	50
						Applied Language Arts/English 12	50
English 9	50	English 10	50	TP Mentorship	50	TP Engineering Core Landscape/Design Build Physics	150
Phy. Ed./Social Studies	50	Social Studies/Fine Arts	50	English 11	50		
Algebra 1/Integrated 1	50	Geometry/Integrated II	50	Social Studies	50		
Science	50	Elective	50	Chemistry	50		

Prerequisites for Grade 11 of Tech Prep: Passage of all parts of 9th grade proficiency test, Algebra I.

Prerequisites for college part of Tech Prep: Articulation or proficiency testing will determine where students place into the program.

Suggested Electives: Photography (fine arts).

Explanation of Tech Prep Blocks: Students will be enrolled in a 150 min. Tech Prep block that will include one academic (science). Grade 11 integrates occupational, employability skills with Geometry/Algebra II. Grade 12 integrates occupational, employability skills with Physics. Other college prep academics will be taught outside the block.

High School Exit Occupations: Beginning drafter, landscape crew member, CAD operator, drafting technician.

College Exit Occupations: Merchandiser, landscape design contractor, landscape foreman, facilities management technician, wholesale/retail nursery manager, botanic garden manager, arboriculture crew member, irrigation specialist, and estate grounds manager.

Westerville Schools
Westerville North High School

1997

Engineering Core/
Graphics Communications/Multimedia
Engineering Technology

Heart of Ohio Tech Prep Consortium

9th Grade	Min.	10th Grade	Min.	11th Grade	Min	12th Grade	Min
TP Career Focus TP High Tech Career Systems/ Keyboarding	50 50	Exploratory Computer Applications TP High Tech Career Systems II	50 50	TP Engineering Core Graphics Communications Multimedia Geometry/Algebra II	150	Social Studies Algebra III/FST/College Prep Applied Language Arts/English 12	50 50 50
English 9	50	English 10	50	TP Mentorship	50	TP Engineering Core Graphics Communications Multimedia Physics	150
Phy. Ed./Social Studies	50	Social Studies/Fine Arts	50	English 11	50		
Algebra 1/Integrated 1	50	Geometry/Integrated II	50	Social Studies	50		
Science	50	Elective (Drafting)	50	Chemistry	50		

Prerequisites for Grade 11 of Tech Prep: Passage of all parts of 9th grade proficiency test, Algetra 1/Integrated 1, Geometry/ Integrated II. Demonstration of the 10th grade communications competencies or the equilavent.

Prerequisites for college port of Tech Prep: Articulation or proficiency testing will determine where students place into the program.

Suggested Electives: Photography (fine arts). Foreign language, Quest 1.

Explanation of Tech Prep Blocks: Students will be enrolled in a 150 min. Tech Prep block that will include one academic (science). Grade 11 integrates occupational, employability skills with Chemistry. Grade 12 integrates occupational, employability skills with Physics. Other college prep academics will be taught outside the block.

High School Exit Occupations: Assistant Photographer, Beginning Drafter, CAD Operator, and Drafting Technician.

College Exit Occupations: (Based on AAS in Graphic Communications) Composition Assistant, Photoengraver Press Operator, Photographer, Computer Graphics Illustrator, Production Artist, Printing Estimator, Typesetter.

Westerville Schools
Westerville North High School

1997

Engineering Core/
Graphics Communications/~~Multimedia~~
~~Engineering~~ Technology

Heart of Ohio Tech Prep Consortium

9th Grade	Min.	10th Grade	Min.	11th Grade	Min	12th Grade	Min
TP Career Focus	50	Exploratory Computer Applications	50	TP Engineering Core Graphics Communications Multimedia Geometry/Algebra II	150	Social Studies	50
TP High Tech Career Systems/ Keyboarding	50	TP High Tech Career Systems II	50			Algebra III/FST/College Prep	50
						Applied Language Arts/English 12	50
English 9	50	English 10	50	TP Mentorship	50	TP Engineering Core Graphics Communications Multimedia Physics	150
Phy. Ed./Social Studies	50	Social Studies/Fine Arts	50	English 11	50		
Algebra 1/Integrated 1	50	Geometry/Integrated II	50	Social Studies	50		
Science	50	Elective (Drafting)	50	Chemistry	50		

Prerequisites for Grade 11 of Tech Prep: Passage of all parts of 9th grade proficiency test, Algetra 1/Integrated 1, Geometry/ Integrated II. Demonstration of the 10th grade communications competencies or the equilavent.

Prerequisites for college port of Tech Prep: Articulation or proficiency testing will determine where students place into the program.

Suggested Electives: Photography (fine arts). Foreign language, Quest 1.

Explanation of Tech Prep Blocks: Students will be enrolled in a 150 min. Tech Prep block that will include one academic (science). Grade 11 integrates occupational, employability skills with Chemistry. Grade 12 integrates occupational, employability skills with Physics. Other college prep academics will be taught outside the block.

High School Exit Occupations: Assistant Photographer, Beginning Drafter, CAD Operator, and Drafting Technician.

College Exit Occupations: (Based on AAS in Graphic Communications) Composition Assistant, Photoengraver Press Operator, Photographer, Computer Graphics Illustrator, Production Artist, Printing Estimator, Typesetter.

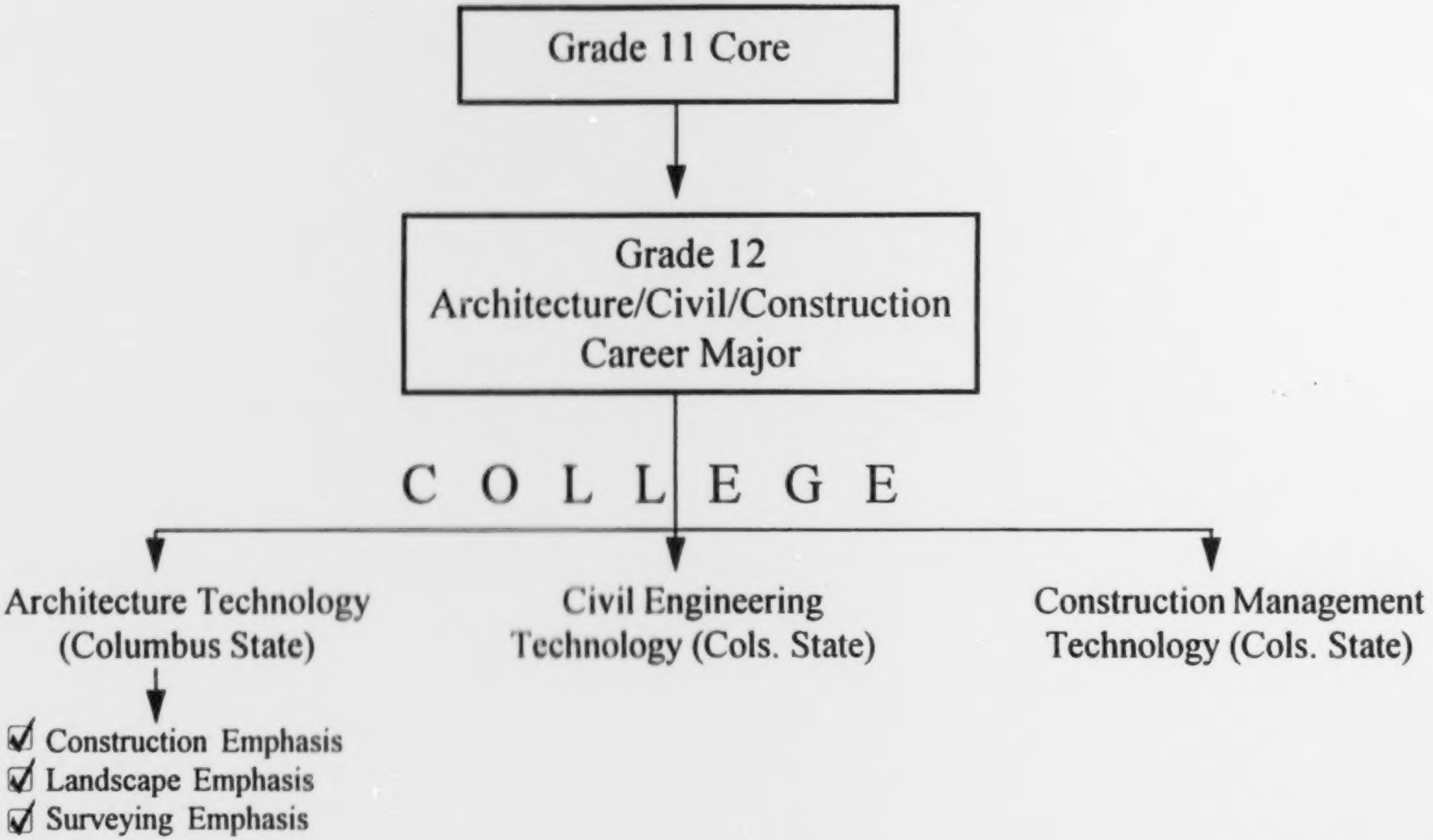
HEART of OHIO TECH PREP CONSORTIUM

1997

Engineering Technologies Core Model

PART I.B:
Postsecondary Curriculum Pathways & Narratives

Columbus State Community College



Grade 11 Core

Grade 12
Architecture/Civil/Construction
Career Major

COLLEGE

Architecture Technology
(Columbus State)

- ☑ Construction Emphasis
- ☑ Landscape Emphasis
- ☑ Surveying Emphasis

Civil Engineering
Technology (Cols. State)

Construction Management
Technology (Cols. State)

COLLEGE OPTIONS FOR H.S. GRADUATES OF THE ARCHITECTURE/CIVIL/CONSTRUCTION CAREER MAJOR

Columbus State Community College **Spring 1997** **Engineering Technologies Core Model**

College Pathway: Architecture Technology-Construction Emphasis

May 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
ENGL 101 Beginning Composition	3	ENGL 102 Essay & Research	3	BMGT 111 Management	5	CIVL 232 Statics & Strength of Materials	3	HUM XXX Humanities	5	SSCI 1XX Social Science	5
MATH 104 Intermediate Algebra	5	MATH 148 College Algebra	5	COMM 1XX Speech or Conf & Group Disc.	3	ARCH 212 Mechanical Systems (HAC)	3	ENGL 204 Technical Writing	3	ARCH 216 Mechanical Systems (Plumbing)	3
ARCH 100 Intro. to Architecture	4	~~CPT 101 Computer Literacy I~~	3	ARCH 155 Structural Systems (Wood)	3	ARCH 232 Building Construction Standards	3	ARCH 214 Mechanical Systems (Electrical)	3	ARCH 264 Working Drawings II	5
~~ARCH 111 Basic Const. Drafting~~	~~3~~	ARCH 161 Architectural Drafting	4	LAND 152 Site Planning	4	ARCH 113 Construction CAD Drafting II	3	ARCH 263 Working Drawings I	4	Technical Elective	3
~~CIVL 120 Basic Const. Materials~~	~~3~~	~~CMGT 121 Building Construction Drawings~~	~~3~~	~~ARCH 112 Const. CAD Drafting~~	~~3~~	ARCH 250 Building Enclosure Materials	3	CIVL 237 Structural CAD Design & Detailing	4		
CMGT 131 Construction Quantity Survey	3	CMGT 106 Supervising Field Operations	3	CMGT 141 Building Estimating	2	ARCH 262 Presentations Drawings	4				
CMGT 115 Building Const. Methods	3	MCT 106 Computer Literacy II	3								

Struck-out courses = those that students may articulate or pass via proficiency testing.
Shaded courses = advanced skills added to the curriculum.

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Heart of Ohio Tech Prep Consortium -- **Engineering Technologies Core Model** -- May 1997
Columbus State -- Architecture Technology - Construction Emphasis

HIGH SCHOOL EXIT OCCUPATIONS:

Entry-Level CAD Drafter
Entry-Level Materials Technician
Construction Laborer
Construction Clerk
Survey Crew Rod-person

COLLEGE EXIT OCCUPATIONS:

Computer Aided Design/Drafter
Materials Technician
Facilities Management Technician

PREREQUISITES FOR COLLEGE PORTION OF TECH PREP:

No specific prerequisites. Articulation and/or proficiency testing will determine where students will enter the program. However, in order to follow the sequence as closely as possible, students should be computer literate and proficient in algebra and geometry. High school level chemistry and physics coursework is also strongly recommended. Finally, they should have mastered the competencies during high school that are relevant to the struckout college technical courses in the college pathway table.

SUGGESTED ELECTIVES:

CMGT 105 Construction Contract Documents (3 credits)
LAND 101 Landscape Principles (3 credits)
SURV 247 Townsite & Urban Development (3 credits)

ADVANCED SKILLS PORTION OF TECH PREP:

Shaded courses in the college pathway table represent the advanced skills portion of the program.

EXPLANATION OF TECH PREP COURSE DIFFERENCE:

Struckout courses in the college pathway table represent those that students may articulate or pass via proficiency testing. Shaded courses represent the advanced skills portion. A student must articulate or proficiency-test out of all struckout courses in order to complete the advances skills portion of the program within the maximum 110 credit hours.

Columbus State Community College **Spring 1997** **Engineering Technologies Core Model**

College Pathway: Architecture Technology-Landscape Emphasis
March 25, 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
ENGL 101 Beginning Composition	3	ENGL 102 Essay & Research	3	BMGT 111 Management	5	CIVL 232 Statics & Strength of Materials	3	HUM XXX Humanities	5	SSCI 1XX Social Science	5
MATH 104 Intermediate Algebra	5	MATH 148 College Algebra	5	COMM 1XX Speech or Conf & Group Disc.	3	ARCH 212 Mechanical Systems (HAC)	3	ENGL 204 Technical Writing	3	ARCH 216 Mechanical Systems (Plumbing)	3
ARCH 100 Intro. to Architecture	4	LAND 102 Landscape Design I	3	ARCH 155 Structural Systems (Wood)	3	ARCH 232 Building Construction Standards	3	ARCH 214 Mechanical Systems (Electrical)	3	ARCH 264 Working Drawings II	5
~~ARCH 111 Basic Const. Drafting~~	~~3~~	ARCH 161 Architectural Drafting	4	LAND 152 Site Planning	4	LAND 202 Landscape Design II	3	ARCH 263 Working Drawings I	4	Technical Elective	3
~~CIVL 120 Basic Const. Materials~~	~~3~~	~~CMGT 121 Building Construction Drawings~~	~~3~~	~~ARCH 112 Const. CAD Drafting~~	~~3~~	ARCH 250 Building Enclosure Materials	3	CIVL 237 Structural CAD Design & Detailing	4		
LAND 101 Landscape Principles	3	ARCH 113 Construction CAD Drafting II	3	LAND 105 Landscape Plants I	4	ARCH 262 Presentations Drawings	4				
~~CPT 101 Computer Literacy I~~	3	MCT 106 Computer Literacy II	3								

Struck-out courses = those that students may articulate or pass via proficiency testing.
Shaded courses = advanced skills added to the curriculum.

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Heart of Ohio Tech Prep Consortium -- **Engineering Technologies Core Model** -- May 1997
Columbus State -- Architecture Technology - Landscape Emphasis

HIGH SCHOOL EXIT OCCUPATIONS:

Entry-Level CAD Drafter
Construction Laborer
Entry-Level Materials Technician
Construction Clerk

COLLEGE EXIT OCCUPATIONS:

Computer-Aided Design/Drafter
Materials Technician
Materials & Equipment Marketing & Sales
Facilities Management Technician
Landscape Designer

PREREQUISITES FOR COLLEGE PORTION OF TECH PREP:

No specific prerequisites. Articulation and/or proficiency testing will determine where students will enter the program. However, in order to follow the sequence as closely as possible, students should be computer literate and proficient in algebra and geometry. High school level chemistry and physics coursework is also strongly recommended. Finally, they should have mastered the competencies during high school that are relevant to the struckout college technical courses in the college pathway table.

SUGGESTED ELECTIVES:

CMGT 105 Construction Contract Documents (3 credits)
ARCH 113 Construction CAD Drafting II (3 credits)

ADVANCED SKILLS PORTION OF TECH PREP:

Shaded courses in the college pathway table represent the advanced skills portion of the program.

EXPLANATION OF TECH PREP COURSE DIFFERENCE:

Struckout courses in the college pathway table represent those that students may articulate or pass via proficiency testing. Shaded courses represent the advanced skills portion. A student must articulate or proficiency-test out of all struckout courses in order to complete the advances skills portion of the program within the maximum 110 credit hours.

Columbus State Community College **Spring 1997** **Engineering Technologies Core Model**

College Pathway: Architecture Technology-Surveying Emphasis
May 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
ENGL 101 Beginning Composition	3	ENGL 102 Essay & Research	3	COMM 1XX Speech or Conf & Group Disc.	3	CIVL 232 Statics & Strength of Materials	3	HUM XXX Humanities	5	SSCI 1XX Social Science	5
MATH 104 Intermediate Algebra	5	MATH 148 College Algebra	5	LAND 152 Site Planning	4	ARCH 212 Mechanical Systems (HAC)	3	ENGL 204 Technical Writing	3	ARCH 216 Mechanical Systems (Plumbing)	3
ARCH 100 Intro. to Architecture	4	BMGT 111 Management	5	ARCH 155 Structural Systems (Wood)	3	ARCH 232 Building Construction Standards	3	ARCH 214 Mechanical Systems (Electrical)	3	ARCH 264 Working Drawings II	5
~~ARCH 111~~ ~~Basic Const. Drafting~~	4	ARCH 161 Architectural Drafting	4	~~ARCH 112~~ ~~Const. CAD Drafting~~	3	ARCH 250 Building Enclosure Materials	3	ARCH 263 Working Drawings I	4	Technical Elective	3
~~CIVL 120~~ ~~Basic Const. Materials~~	3	~~CMGT 121~~ ~~Building Construction Drawings~~	3	**CMGT 123** **Heavy Const. Drawings**	3	ARCH 262 Presentations Drawings	4	CIVL 237 Structural CAD Design & Detailing	4	**SURV 247** **Townsite & Urban Development**	3
CPT 101 Computer Literacy I	3			SURV 141 Basic Surveying	4	SURV 241 Route Surveying	4				
ARCH 113 Construction CAD Drafting II	3										

Struck-out courses = those that students may articulate or pass via proficiency testing.
Shaded courses = advanced skills added to the curriculum.

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Heart of Ohio Tech Prep Consortium -- **Engineering Technologies Core Model** -- May 1997
Columbus State -- Architecture Technology - Surveying Emphasis

HIGH SCHOOL EXIT OCCUPATIONS:

Entry-Level CAD Drafter
Entry-Level Materials Technician
Construction Laborer
Construction Clerk
Survey Crew Rod-person

COLLEGE EXIT OCCUPATIONS:

Computer Aided Design/Drafter
Surveying Technician/Construction Layout
Materials Technician
Facilities Management Technician

PREREQUISITES FOR COLLEGE PORTION OF TECH PREP:

No specific prerequisites. Articulation and/or proficiency testing will determine where students will enter the program. However, in order to follow the sequence as closely as possible, students should be computer literate and proficient in algebra and geometry. High school level chemistry and physics coursework is also strongly recommended. Finally, they should have mastered the competencies during high school that are relevant to the struckout college technical courses in the college pathway table.

SUGGESTED ELECTIVES:

CMGT 105 Construction Contract Documents (3 credits)
LAND 101 Landscape Principles (3 credits)

ADVANCED SKILLS PORTION OF TECH PREP:

Shaded courses in the college pathway table represent the advanced skills portion of the program.

EXPLANATION OF TECH PREP COURSE DIFFERENCE:

Struckout courses in the college pathway table represent those that students may articulate or pass via proficiency testing. Shaded courses represent the advanced skills portion. A student must articulate or proficiency-test out of all struckout courses in order to complete the advances skills portion of the program within the maximum 110 credit hours.

HEART OF OHIO TECH PREP CONSORTIUM
CURRICULUM PATHWAY NARRATIVE

Engineering Technologies Core Model, May 1997

Columbus State Community College
Architecture Technology
Pathways

In the space below, describe the systemic change at the postsecondary level and what new options will be available for Tech Prep college students (occupational, employability, and academic).

Systemic change that will occur in the Architecture Technology program at Columbus State, as a result of the installation of Tech Prep pathways in the Heart of Ohio Tech Prep Consortium, include the following:

- Competencies offering additional breadth and depth to Tech Prep program completers will be possible at the postsecondary level as a result of students matriculating to Columbus State better prepared to engage in college-level work. This will help ensure that business and industry's expectations for qualified technicians and professionals are being met by increasing the time available to learn additional competencies that are being requested by employers. These competencies are represented by the pathway's advanced skills coursework (see the shaded cells in the college pathway table).

- Business and industry are seeking graduates that are broadly educated across disciplines as well as prepared specifically in the technical specialty. The Heart of Ohio Consortium's approach to designing Tech Prep models addresses these needs by prescribing cross-disciplinary, multi-disciplinary educational approaches throughout the curriculum, most intensely at the secondary level, but also occurring broadly in the postsecondary curriculum. This broad preparation optimizes program graduates' ability to be flexible, job-ready, and immediately productive upon completion of the Columbus State Tech Prep program. Graduates of the Tech Prep program are expected, as a result of their advanced skills, to enhance their employers' competitive edge in a period of rapid change in both technologies and markets.

- Qualified secondary Tech Prep students in the program will have the opportunity to begin their college experience early through the use of Post-Secondary Enrollment Options. Tech Prep models define appropriate coursework or these students to ensure a seamless pathway through the model. In addition, Columbus State departments will actively seek ways to connect with the secondary programs, their teachers, and their students, through a variety of partnerships that may include (but not be limited to) demonstrations and career talks by college personnel at the high school sites, loan or donation of equipment, team teaching of certain competencies at the high school or college site, access for Tech Prep high school classes to college facilities and equipment, opportunities for high school Tech Prep teachers to participate in and/or audit relevant college technical courses (in some cases, tuition-free), field trips to the college for prospective and actual Tech Prep students, and the like. These partnerships extend the relationships of the high schools and the college well beyond their more usual, traditional interactions.

- Articulation agreements between the Consortium's Engineering Technologies Core model/Architecture/Civil/Construction Career Major (grades 11-12) and Columbus State's Tech Prep Architecture Technology program will be formalized in the coming year. This should clarify and enhance matriculation opportunities for secondary program completers into the postsecondary part of the Tech Prep model.

- Columbus State technical programs are regularly validated through ongoing business and industry surveys, as well as input from program advisory committees and adjunct faculty who are also actively employed in relevant industry organizations. Although Columbus State is confident that its Architecture Technology program currently meets business and industry needs, the faculty and administration of the college acknowledge that some foundational competencies can be delivered within a collaboratively developed secondary curriculum. The development of this Tech Prep model provides Tech Prep college students with a unique opportunity to augment a solid associate degree with advanced skills coursework that is not currently included in the program requirements, but which offers enhanced value to both program graduates and their future employers.

Columbus State Community College

Spring 1997

Engineering Technologies Core Model
College Pathway: Civil Engineering Technology
May 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
ENGL 101 Beginning Composition	3	ENGL 102 Essay & Research	3	~~CPT 101 Computer Literacy I~~	3	MCT 106 Computer Literacy II	3	SSCI XXX Social Science	5	HUM XXX Humanities	5
MATH 148 College Algebra	5	MATH 135 Elementary Statistics	5	Basic Science PHYS 117, GEOL 101, or CHEM 113	5	**CMGT 241 Planning & Scheduling**	3	COMM XXX Speech or Conf & Group Disc.	3	SURV 247 Townsite & Urban Develop.	3
CMGT 123 Heavy Const. Drawings	3	CMGT 131 Const. Quantity Survey	3	SURV 141 Basic Surveying	4	SURV 241 Route Surveying	4	SURV 245 Survey Law	3	SURV 249 Land Subdiv. Systems	3
CIVL 121 Heavy Const. Materials	3	CMGT 125 Heavy Const. Methods	3	ENGL 204 Technical Writing	3	**LAND 152 Site Planning**	4	CIVL 232 Statics & Strength of Materials	3	SURV 243 Heavy Const. Standards	3
ARCH 113 Const. CAD Drafting II	3	**CIVL 112 MicroStation CAD Drafting**	3	CMGT 106 Supervising Field Operations	3	CIVL 221 Elementary Hydraulics	3	CIVL 223 Public Utility Systems	3	**CMGT 248 Heavy Const. Estimating**	2
~~CMGT 121 Building Const. Drawings~~	3	~~CMGT 105 Const. Contract Documents~~	3			**REAL 102 Real Estate Law**	3			Technical Elective	3
~~ARCH 111 Const. Basic Drafting~~	4	~~ARCH 112 Const. CAD Drafting~~	3			~~CMGT 112 Const Industry Survey (Tech. Elective)~~	3				
~~CIVL 120 Basic Const. Materials~~	3										

Struck-out courses = those that students may articulate or pass via proficiency testing.
Shaded courses = advanced skills added to the curriculum.

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Heart of Ohio Tech Prep Consortium -- **Engineering Technologies Core Model** -- May 1997
Columbus State -- Civil Engineering Technology

HIGH SCHOOL EXIT OCCUPATIONS:

Entry-Level CAD Drafter
Entry-Level Materials Technician
Construction Laborer
Construction Clerk
Survey Crew Rod-person

COLLEGE EXIT OCCUPATIONS:

Construction Quality Control Technician
Construction Field Engineer
Construction Estimator
Computer Aided Design/Drafter
Asst. Construction Superintendent
Facilities Management Technician
Materials Technician
Surveying Technician/Construction Layout

PREREQUISITES FOR COLLEGE PORTION OF TECH PREP:

No specific prerequisites. Articulation and/or proficiency testing will determine where students will enter the program. However, in order to follow the sequence as closely as possible, students should be computer literate and proficient in algebra and geometry. High school level chemistry and physics coursework is also strongly recommended. Finally, they should have mastered the competencies during high school that are relevant to the struckout college technical courses in the college pathway table.

SUGGESTED ELECTIVES:

CIVL 291 Field Co-op Experience

ADVANCED SKILLS PORTION OF TECH PREP:

Shaded courses in the college pathway table represent the advanced skills portion of the program.

EXPLANATION OF TECH PREP COURSE DIFFERENCE:

Struckout courses in the college pathway table represent those that students may articulate or pass via proficiency testing. Shaded courses represent the advanced skills portion. A student must articulate or proficiency-test out of all struckout courses in order to complete the advances skills portion of the program within the maximum 110 credit hours.

HEART OF OHIO TECH PREP CONSORTIUM
CURRICULUM PATHWAY NARRATIVE

Engineering Technologies Core Model, May 1997

Columbus State Community College
Civil Engineering Technology Pathway

In the space below, describe the systemic change at the postsecondary level and what new options will be available for Tech Prep college students (occupational, employability, and academic).

Systemic change that will occur in the Civil Engineering Technology program at Columbus State, as a result of the installation of Tech Prep pathways in the Heart of Ohio Tech Prep Consortium, include the following:

- Competencies offering additional breadth and depth to Tech Prep program completers will be possible at the postsecondary level as a result of students matriculating to Columbus State better prepared to engage in college-level work. This will help ensure that business and industry's expectations for qualified technicians and professionals are being met by increasing the time available to learn additional competencies that are being requested by employers. These competencies are represented by the pathway's advanced skills coursework (see the shaded cells in the college pathway table).

- Business and industry are seeking graduates that are broadly educated across disciplines as well as prepared specifically in the technical specialty. The Heart of Ohio Consortium's approach to designing Tech Prep models addresses these needs by prescribing cross-disciplinary, multi-disciplinary educational approaches throughout the curriculum, most intensely at the secondary level, but also occurring broadly in the postsecondary curriculum. This broad preparation optimizes program graduates' ability to be flexible, job-ready, and immediately productive upon completion of the Columbus State Tech Prep program. Graduates of the Tech Prep program are expected, as a result of their advanced skills, to enhance their employers' competitive edge in a period of rapid change in both technologies and markets.

- Qualified secondary Tech Prep students in the program will have the opportunity to begin their college experience early through the use of Post-Secondary Enrollment Options. Tech Prep models define appropriate coursework or these students to ensure a seamless pathway through the model. In addition, Columbus State departments will actively seek ways to connect with the secondary programs, their teachers, and their students, through a variety of partnerships that may include (but not be limited to) demonstrations and career talks by college personnel at the high school sites, loan or donation of equipment, team teaching of certain competencies at the high school or college site, access for Tech Prep high school classes to college facilities and equipment, opportunities for high school Tech Prep teachers to participate in and/or audit relevant college technical courses (in some cases, tuition-free), field trips to the college for prospective and actual Tech Prep students, and the like. These partnerships extend the relationships of the high schools and the college well beyond their more usual, traditional interactions.

o Articulation agreements between the Consortium's Engineering Technologies Core model/Architecture/Civil/Construction Career Major (grades 11-12) and Columbus State's Tech Prep Civil Engineering Technology program will be formalized in the coming year. This should clarify and enhance matriculation opportunities for secondary program completers into the postsecondary part of the Tech Prep model.

o Columbus State technical programs are regularly validated through ongoing business and industry surveys, as well as input from program advisory committees and adjunct faculty who are also actively employed in relevant industry organizations. Although Columbus State is confident that its Civil Engineering Technology program currently meets business and industry needs, the faculty and administration of the college acknowledge that some foundational competencies can be delivered within a collaboratively developed secondary curriculum. The development of this Tech Prep model provides Tech Prep college students with a unique opportunity to augment a solid associate degree with advanced skills coursework that is not currently included in the program requirements, but which offers enhanced value to both program graduates and their future employers.

Columbus State Community College **Spring 1997** **Engineering Technologies Core Model**

College Pathway: Construction Management Technology
May 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
ENGL 101 Beginning Composition	3	ENGL 102 Essay & Research	3	MCT 106 Computer Literacy II	3	ENGL 200 Business Communications	3	HUM XXX Humanities	5	SSCI XXX Social Science	5
MATH 104 Intermediate Algebra	5	MATH 148 College Algebra	5	MATH 135 Elementary Statistics	5	CMGT 248 Heavy Const. Estimating	2	COMM XXX Speech or Conf & Group Disc.	3	CMGT 261 Construction Project Management	3
CMGT 115 Building Const. Methods	3	~~CPT 101~~ ~~Computer Literacy I~~	3	CMGT 135 Safety & Loss Prevention	3	CMGT 241 Planning & Scheduling	3	CMGT 251 Construction Cost Controls	3	CMGT 263 Marketing Construction Services	3
CMGT 123 Heavy Const. Drawings	3	CMGT 106 Supervising Field Operations	3	CMGT 141 Building Estimating	2	CMGT 243 Construction Labor Law	3	CMGT 252 Construction Contract Law	3	SURV 241 Route Surveying	4
CMGT 125 Heavy Const. Methods	3	CMGT 131 Const. Quantity Survey	3	CIVL 121 Heavy Const. Materials	3	SURV 141 Basic Surveying	4	CMGT 231 Computer Estimating	3	Technical Elective	3
~~CMGT 105~~ ~~Const. Contract Documents~~	3			~~CIVL 120~~ ~~Basic Const. Materials~~	3	CMGT 253 Residential Construction	3	Technical Elective	3		
~~CMGT 121~~ ~~Building Construction Drawings~~	3										

Struck-out courses = those that students may articulate or pass via proficiency testing.
Shaded courses = advanced skills added to the curriculum.

BEST COPY AVAILABLE

Heart of Ohio Tech Prep Consortium -- **Engineering Technologies Core Model** -- May 1997
Columbus State -- Construction Management Technology

HIGH SCHOOL EXIT OCCUPATIONS:

Entry-Level CAD Drafter
Entry-Level Materials Technician
Construction Laborer
Construction Clerk
Survey Crew Rod-person

COLLEGE EXIT OCCUPATIONS:

Construction Quality Control Technician
Asst. Construction Superintendent
Construction Estimator
HVAC Equipment Application Technician
Materials Technician
Asst. Construction Project Manager
Construction Scheduler
Facilities Management Technician
Construction Field Engineer
Surveying Technician/Construction Layout
Materials & Equipment Marketing & Sales

PREREQUISITES FOR COLLEGE PORTION OF TECH PREP:

No specific prerequisites. Articulation and/or proficiency testing will determine where students will enter the program. However, in order to follow the sequence as closely as possible, students should be computer literate and proficient in algebra and geometry. High school level chemistry and physics coursework is also strongly recommended. Finally, they should have mastered the competencies during high school that are relevant to the struckout college technical courses in the college pathway table.

SUGGESTED ELECTIVES:

CMGT Work Experience Seminar
CMGT Construction Work Experience
SURV 245 Survey Law
CMGT 231 Computer Estimating

ADVANCED SKILLS PORTION OF TECH PREP:

Shaded courses in the college pathway table represent the advanced skills portion of the program.

EXPLANATION OF TECH PREP COURSE DIFFERENCE:

Struckout courses in the college pathway table represent those that students may articulate or pass via proficiency testing. Shaded courses represent the advanced skills portion. A student must articulate or proficiency-test out of all struckout courses in order to complete the advances skills portion of the program within the maximum 110 credit hours.

HEART OF OHIO TECH PREP CONSORTIUM
CURRICULUM PATHWAY NARRATIVE

Engineering Technologies Core Model, May 1997

Columbus State Community College
Construction Management Technology Pathway

In the space below, describe the systemic change at the postsecondary level and what new options will be available for Tech Prep college students (occupational, employability, and academic).

Systemic change that will occur in the Construction Management Technology program at Columbus State, as a result of the installation of Tech Prep pathways in the Heart of Ohio Tech Prep Consortium, include the following:

- Competencies offering additional breadth and depth to Tech Prep program completers will be possible at the postsecondary level as a result of students matriculating to Columbus State better prepared to engage in college-level work. This will help ensure that business and industry's expectations for qualified technicians and professionals are being met by increasing the time available to learn additional competencies that are being requested by employers. These competencies are represented by the pathway's advanced skills coursework (see the shaded cells in the college pathway table).

- Business and industry are seeking graduates that are broadly educated across disciplines as well as prepared specifically in the technical specialty. The Heart of Ohio Consortium's approach to designing Tech Prep models addresses these needs by prescribing cross-disciplinary, multi-disciplinary educational approaches throughout the curriculum, most intensely at the secondary level, but also occurring broadly in the postsecondary curriculum. This broad preparation optimizes program graduates' ability to be flexible, job-ready, and immediately productive upon completion of the Columbus State Tech Prep program. Graduates of the Tech Prep program are expected, as a result of their advanced skills, to enhance their employers' competitive edge in a period of rapid change in both technologies and markets.

- Qualified secondary Tech Prep students in the program will have the opportunity to begin their college experience early through the use of Post-Secondary Enrollment Options. Tech Prep models define appropriate coursework or these students to ensure a seamless pathway through the model. In addition, Columbus State departments will actively seek ways to connect with the secondary programs, their teachers, and their students, through a variety of partnerships that may include (but not be limited to) demonstrations and career talks by college personnel at the high school sites, loan or donation of equipment, team teaching of certain competencies at the high school or college site, access for Tech Prep high school classes to college facilities and equipment, opportunities for high school Tech Prep teachers to participate in and/or audit relevant college technical courses (in some cases, tuition-free), field trips to the college for prospective and actual Tech Prep students, and the like. These partnerships extend the relationships of the high schools and the college well beyond their more usual, traditional interactions.

- Articulation agreements between the Consortium's Engineering Technologies Core model/Architecture/Civil/Construction Career Major (grades 11-12) and Columbus State's Tech Prep Construction Management Technology program will be formalized in the coming year. This should clarify and enhance matriculation opportunities for secondary program completers into the postsecondary part of the Tech Prep model.

- Columbus State technical programs are regularly validated through ongoing business and industry surveys, as well as input from program advisory committees and adjunct faculty who are also actively employed in relevant industry organizations. Although Columbus State is confident that its Construction Management Technology program currently meets business and industry needs, the faculty and administration of the college acknowledge that some foundational competencies can be delivered within a collaboratively developed secondary curriculum. The development of this Tech Prep model provides Tech Prep college students with a unique opportunity to augment a solid associate degree with advanced skills coursework that is not currently included in the program requirements, but which offers enhanced value to both program graduates and their future employers.

OHIO UNIVERSITY-LANCASTER 1997-98 DESIGN INDUSTRIAL TECHNOLOGY (A.A.S.)
HEART OF OHIO TECH PREP CONSORTIUM CIVIL OPTION

Freshman Year Sequence					
Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
IT 101 - Engineering Drawing I	3	IT 102 - Engineering Drawing II	3	IT 121 - Descriptive Geometry	3
MATH 113 - Algebra	5	MATH 115 - Pre Calculus	5	MATH 163A - Intro to Calculus	4
CHEM 121 - Principles of Chemistry	4	CHEM 122 - Principles of Chemistry	4	DTCH 150 Computer Aided Drawing I	3
ENG 151 - Freshman Composition	5	CTCH 125 - Intro to Computers	4	MTCH 290 - Materials	3
				Elective	4
TOTAL Credit Hours	17		16		17
Sophomore Year Sequence					
Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
PHYS 201 - Physics: Mechanics	4	PHYS 202 - Physics: Electricity/Heat/Light	4	DTCH 151 - Computer Aided Drawing II	3
DTCH 200 - Mechanics I	4	DTCH 210 - Mechanics II	4	DTCH 251 - Structural Design II	4
ETCH 110 - Basic Electronics	4	DTCH 215 - Intro to Fluids, Hydrology, and Hydraulics	3	INCO 103 - Fundamentals of Public Speaking	4
CE 210 - Plane Surveying	4	DTCH 250 - Structural Design I	4	Humanities/Social Science	3 to 5
				DTCH 299 - Special Problems	3
TOTAL Credit Hours	16		15		17 to 19

OHIO UNIVERSITY-LANCASTER 1997-98 DESIGN INDUSTRIAL TECHNOLOGY (A.A.S.)
HEART OF OHIO TECH PREP CONSORTIUM Mechanical Option

Freshman Year Sequence					
Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
IT 101 - Engineering Drawing I	**3**	**IT 102 - Engineering Drawing II**	**3**	**IT 115 - Metal Fabrication**	**3**
MATH 113 - Algebra	**5**	**MATH 115 - Pre Calculus**	**5**	**MATH 163A - Intro to Calculus**	**4**
CHEM 121 - Principles of Chemistry	**4**	**CHEM 122 - Principles of Chemistry**	**4**	**DTCH 150 Computer Aided Drawing I**	**3**
ENG 151 - Freshman Composition	**5**	**CTCH 125 - Intro to Computers**	**4**	**MTCH 290 - Materials**	**3**
				Elective	**4**
TOTAL Credit Hours	**17**		**16**		**17**
Sophomore Year Sequence					
Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
PHYS 201 - Physics: Mechanics	**4**	**PHYS 202 - Physics: Electricity/Heat/Light**	**4**	**DTCH 151 - Computer Aided Drawing II**	**3**
DTCH 200 - Mechanics I	**4**	**DTCH 210 - Mechanics II**	**4**	**MTCH 220 - Basic Hydraulics**	**3**
ETCH 110 - Basic Electronics	**4**	**DTCH 230 - Tool Design**	**4**	**DTCH 220 - Machine Design**	**3**
IT 117 - Basic Metal Machining	**3**	**INCO 103 - Fundamentals of Public Speaking**	**4**	**Humanities/Social Science**	**3 to 5**
				DTCH 299 - Special Problems	**3**
TOTAL Credit Hours	**15**		**16**		**15 to 17**

Curriculum Pathway Narrative

Ohio University-Lancaster Design Engineering Technology
March 1997

Because of the initiation of Tech Prep pathways, expanded offerings are available at the post secondary level.

It is anticipated that students following the Tech Prep pathways will be better prepared to do college level work. It is expected that no remedial work will be required and it is quite possible some courses can be taken "course credit by examination." Better prepared students entering the program will allow more "in-depth" coverage of competencies requested by employers in the following areas:

- Technical Report Writing
- Mathematics
- Physics
- Verbal Communications

The design industry indicates that graduates need advanced skills in the following areas:

- Computer Aided Drafting/Design
- Computer Skills including an understanding of debugging skills with D.O.S., Windows, Networking, and other areas.
- Civil Engineering Technology Design
- Mechanical Engineering Technology Design

The advanced competencies will be added to the curriculum within the appropriate course offerings.

Industry is seeking graduates who are broadly educated across discipline as well as prepared specifically in technology specialties related to their primary field. The quality of education received at Ohio University-Lancaster and the advantages offered at a university, assure graduates of a competitive edge with their peers.

OHIO UNIVERSITY - LANCASTER 1997-98 ELECTRONICS TECHNOLOGY (A.A.S.)

HEART OF OHIO TECH PREP CONSORTIUM

Freshman Year Sequence

Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
ETCH 110 - Basic Electronics	4	ETCH 111 - A.C. And D.C. Circuit Analysis	4	ETCH 112 - Industrial Electronics	4
IT 101 - Engineering Drawing	3	BA 101 - Business and It's Environment or ECON 103 - Principles of Microeconomics	4	ETCH 120 - Digital Electronics	4
IT 115 - Metal Fabrication	3	MATH 115 - Pre-Calculus or MATH 118 - Elementary Applied Mathematics	4 or 5	INCO 103 - Public Speaking	4
MATH 113 - Algebra	5	PSY 101 - General Psychology	5	MATH 163A - Introduction to Calculus or MATH 263A - Analytic Geometry and Calculus	4
TOTAL Credit Hours	15		17 or 18		16

Sophomore Year Sequence

Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
ETCH 220 - Electrical Motors, Control Circuits, and Computers	4	ETCH 260 - Data Communications	4	ENG 151 - Freshman Composition	5
ETCH 236A - Microprocessor & Computer Basics	4	ETCH 221A - Programmable Controllers, Instrumentation & Process Control	4	ETCH 221B - Continuation of 221A	4
PHYS 201 - Introduction to Physics	4	ETCH 236B - Microprocessor & Computer Interfacing	4	ETCH 288 - Personal Computer Maintenance	4
ETCH 289 - Electronic Trouble-Shooting & Repair	4	PHYS 202 - Introduction to Physics	4	Elective	1 to 3
Elective	1 to 3				
TOTAL Credit Hours	17 to 20		16		14 to 16

ELECTRONICS TECHNOLOGY

HIGH SCHOOL EXIT TITLES

Component Assembler
Electronics Technician
Salesperson

A.A.S. DEGREE JOB TITLES

Junior Engineer
Electrical Technologist
Instrumentation Technician
Computer Maintenance Technician
Field Service Engineer
Salesperson
Industrial Maintenance Technician

Columbus State Community College **Spring 1997** **Engineering Technologies Core Model**

College Pathway: Electronic Engineering Technology
May 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
ENGL 101 Beginning Composition	3	ENGL 102 Essay & Research	3	ENGL 204 Technical Writing	3	EET 250 Electronic Communications	4	EET 254 Electronics Fabrication	2	EET 2XX Technical Elective	3
~~MATH 111 Technical Mathematics I~~	4	PHYS 177 Tech Physics (Mechanics)	4	MATH 151 Calculus & Analytic Geometry I	5	EET 251 Electronic Communications Laboratory	2	EET 260 Industrial Electronics	4	**EET 262 Digital Communications & Telecommuncations**	3
~~EET 110 Electronic Drafting~~	2	MATH 113 Technical Mathematics III	4	EET 241Electronic Devices Circuit Analysis	4	MATH 152 Calculus & Analytic Geometry II	5	EET 261 Industrial Electronics Laboratory	2	**EET 264 Fiberoptic Communications**	3
~~EET 111 DC Fundamentals~~	4	EET 130 Electronic Devices	4	EET 242 Electronic Device Circuit Analysis Lab	2	EET 252 Microprocessors	4	SSCI 101, 102, 103, OR 104 (select one)	5	**EET 255 Instrumentation & Controls**	3
~~EET 112 DC Laboratory~~	2	EET 131 Electronic Devices Laboratory	2	EET 243 Digital Devices	4	EET 253 Microprocessor Laboratory	2	~~EET 144 PC Hardware~~	3	HUM 111, 112, 113, 151, o4 152 (select one)	5
MATH 112 Technical Mathematics II	4	EET 132 Digital Fundamentals	3	EET 244 Digital Devices Laboratory	2	PHYS 178 Technical Physics (Heat/Light/Sound)	4				
EET 120 AC Fundamentals	4	COMM 105 Speech	3								
EET 121 AC Laboratory	2										

Struck-out courses = those that students may articulate or pass via proficiency testing.
Shaded courses = advanced skills added to the curriculum.

Heart of Ohio Tech Prep Consortium -- **Engineering Technologies Core Model** -- May 1997
Columbus State -- Electronic Engineering Technology

HIGH SCHOOL EXIT OCCUPATIONS:

Component Assembler
Electronics Technician
Salesperson

COLLEGE EXIT OCCUPATIONS:

Electronics Service Technician
Assistant Manufacturing Engineer
Avionics Technician/Supervisor
Engineering Technician
Test Technician
Product Technical Specialist

PREREQUISITES FOR COLLEGE PORTION OF TECH PREP:

No specific prerequisites. Articulation and/or proficiency testing will determine where students will enter the program. However, in order to follow the sequence as closely as possible, students should be computer literate and proficient in algebra and geometry. High school level chemistry and physics coursework is also strongly recommended. Finally, they should have mastered the competencies during high school that are relevant to the struckout college technical courses in the college pathway table.

SUGGESTED ELECTIVES:

N/A

ADVANCED SKILLS PORTION OF TECH PREP:

Shaded courses in the college pathway table represent the advanced skills portion of the program.

EXPLANATION OF TECH PREP COURSE DIFFERENCE:

Struckout courses in the college pathway table represent those that students may articulate or pass via proficiency testing. Shaded courses represent the advanced skills portion. A student must articulate or proficiency-test out of all struckout courses in order to complete the advances skills portion of the program within the maximum 110 credit hours.

HEART OF OHIO TECH PREP CONSORTIUM
CURRICULUM PATHWAY NARRATIVE

Engineering Technologies Core Model, May 1997

Columbus State Community College
Electronic Engineering Technology Pathway

In the space below, describe the systemic change at the postsecondary level and what new options will be available for Tech Prep college students (occupational, employability, and academic).

Systemic change that will occur in the Electronic Engineering Technology program at Columbus State, as a result of the installation of Tech Prep pathways in the Heart of Ohio Tech Prep Consortium, include the following:

o Competencies offering additional breadth and depth to Tech Prep program completers will be possible at the postsecondary level as a result of students matriculating to Columbus State better prepared to engage in college-level work. This will help ensure that business and industry's expectations for qualified technicians and professionals are being met by increasing the time available to learn additional competencies that are being requested by employers. These competencies are represented by the pathway's advanced skills coursework (see the shaded cells in the college pathway table).

o Business and industry are seeking graduates that are broadly educated across disciplines as well as prepared specifically in the technical specialty. The Heart of Ohio Consortium's approach to designing Tech Prep models addresses these needs by prescribing cross-disciplinary, multi-disciplinary educational approaches throughout the curriculum, most intensely at the secondary level, but also occurring broadly in the postsecondary curriculum. This broad preparation optimizes program graduates' ability to be flexible, job-ready, and immediately productive upon completion of the Columbus State Tech Prep program. Graduates of the Tech Prep program are expected, as a result of their advanced skills, to enhance their employers' competitive edge in a period of rapid change in both technologies and markets.

o Qualified secondary Tech Prep students in the program will have the opportunity to begin their college experience early through the use of Post-Secondary Enrollment Options. Tech Prep models define appropriate coursework or these students to ensure a seamless pathway through the model. In addition, Columbus State departments will actively seek ways to connect with the secondary programs, their teachers, and their students, through a variety of partnerships that may include (but not be limited to) demonstrations and career talks by college personnel at the high school sites, loan or donation of equipment, team teaching of certain competencies at the high school or college site, access for Tech Prep high school classes to college facilities and equipment, opportunities for high school Tech Prep teachers to participate in and/or audit relevant college technical courses (in some cases, tuition-free), field trips to the college for prospective and actual Tech Prep students, and the like. These partnerships extend the relationships of the high schools and the college well beyond their more usual, traditional interactions.

o Articulation agreements between the Consortium's Engineering Technologies Core model/Electronics Engineering Technology Career Major (grades 11-12) and Columbus State's Tech Prep Electronic Engineering Technology program will be formalized in the coming year. This should clarify and enhance matriculation opportunities for secondary program completers into the postsecondary part of the Tech Prep model.

o Columbus State technical programs are regularly validated through ongoing business and industry surveys, as well as input from program advisory committees and adjunct faculty who are also actively employed in relevant industry organizations. Although Columbus State is confident that its Electronic Engineering Technology program currently meets business and industry needs, the faculty and administration of the college acknowledge that some foundational competencies can be delivered within a collaboratively developed secondary curriculum. The development of this Tech Prep model provides Tech Prep college students with a unique opportunity to augment a solid associate degree with advanced skills coursework that is not currently included in the program requirements, but which offers enhanced value to both program graduates and their future employers.

Columbus State Community College **Spring 1997** **Engineering Technologies Core Model**

College Pathway: Graphic Communications

May 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
~~GRPH 112 Introduction to Computer Graphics~~	3	GRPH 125 Image Assembly	4	GRPH 130 Press Operations	3	~~GRPH 243 Computer Graphic Illustration~~	3	GRPH 251 Electronic Imaging	3	GRPH 140 Press Operations	3
GRPH 110 Survey of Graphic Communications	3	~~GRPH 122 Electronic Publishing~~	5	BMGT 101 Introduction to Business	5	GRPH 242 Lithographic Camera	3	GRPH 244 Quality Control in Graphic Commun.	4	HUM 1xx Humanities	5
~~GRPH 111 Black & White Photography~~	3	~~PHYS 100 Introduction to Physics~~	4	GRPH 131 Design & Typography	3	BMGT 111 Management	5	ACCT 101 Financial Accounting	4	**GRPH 282 Electronic Publishing II**	3
ENGL 101 Beginning Composition	3	ENGL 102 Essay & Research	3	GRPH 132 Paper & Ink	3	GRPH 241 Estimating		SSCI 10x Social & Behavioral Science	5	**GRPH 283 Multimedia Presentation Graphics**	3
MATH 103 Beginning Algebra II	4	NSCI 101 Natural Science I	5	COMM 105 Speech	3	ENGL 204 Technical Writing	3	**GRPH 281 Color Photography**	3		
	?					**GRPH 299 Special Topics in Graphic Communications**	3				

Struck-out courses = those that students may articulate or pass via proficiency testing.
Shaded courses = advanced skills added to the curriculum.

Heart of Ohio Tech Prep Consortium -- **Engineering Technologies Core Model** -- May 1997
Columbus State -- Graphic Communications Technology

HIGH SCHOOL EXIT OCCUPATIONS:

Assistant Photographer
Beginning Drafter
CAD Operator
Drafting Technician

COLLEGE EXIT OCCUPATIONS:

Composition Assistant
Photoengraver Press Operator
Photographer
Computer Graphics Illustrator
Production Artist
Printing Estimator
Typesetter

PREREQUISITES FOR COLLEGE PORTION OF TECH PREP:

No specific prerequisites. Articulation and/or proficiency testing will determine where students will enter the program. However, in order to follow the sequence as closely as possible, students should be computer literate and proficient in algebra and geometry. High school level chemistry and physics coursework is also strongly recommended. Finally, they should have mastered the competencies during high school that are relevant to the struckout college technical courses in the college pathway table.

SUGGESTED ELECTIVES:

N/A

ADVANCED SKILLS PORTION OF TECH PREP:

Shaded courses in the college pathway table represent the advanced skills portion of the program.

EXPLANATION OF TECH PREP COURSE DIFFERENCE:

Struckout courses in the college pathway table represent those that students may articulate or pass via proficiency testing. Shaded courses represent the advanced skills portion. A student must articulate or proficiency-test out of all struckout courses in order to complete the advances skills portion of the program within the maximum 110 credit hours.

HEART OF OHIO TECH PREP CONSORTIUM
CURRICULUM PATHWAY NARRATIVE

Engineering Technologies Core Model, May 1997

Columbus State Community College
Graphic Communications Technology Pathway

In the space below, describe the systemic change at the postsecondary level and what new options will be available for Tech Prep college students (occupational, employability, and academic).

Systemic change that will occur in the Graphic Communications Technology program at Columbus State, as a result of the installation of Tech Prep pathways in the Heart of Ohio Tech Prep Consortium, include the following:

- Competencies offering additional breadth and depth to Tech Prep program completers will be possible at the postsecondary level as a result of students matriculating to Columbus State better prepared to engage in college-level work. This will help ensure that business and industry's expectations for qualified technicians and professionals are being met by increasing the time available to learn additional competencies that are being requested by employers. These competencies are represented by the pathway's advanced skills coursework (see the shaded cells in the college pathway table).

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- Qualified secondary Tech Prep students in the program will have the opportunity to begin their college experience early through the use of Post-Secondary Enrollment Options. Tech Prep models define appropriate coursework or these students to ensure a seamless pathway through the model. In addition, Columbus State departments will actively seek ways to connect with the secondary programs, their teachers, and their students, through a variety of partnerships that may include (but not be limited to) demonstrations and career talks by college personnel at the high school sites, loan or donation of equipment, team teaching of certain competencies at the high school or college site, access for Tech Prep high school classes to college facilities and equipment, opportunities for high school Tech Prep teachers to participate in and/or audit relevant college technical courses (in some cases, tuition-free), field trips to the college for prospective and actual Tech Prep students, and the like. These partnerships extend the relationships of the high schools and the college well beyond their more usual, traditional interactions.

- Articulation agreements between the Consortium's Engineering Technologies Core model/Graphic Communications Career Major (grades 11-12) and Columbus State's Tech Prep Graphic Communications Technology program will be formalized in the coming year. This should clarify and enhance matriculation opportunities for secondary program completers into the postsecondary part of the Tech Prep model.

- Columbus State technical programs are regularly validated through ongoing business and industry surveys, as well as input from program advisory committees and adjunct faculty who are also actively employed in relevant industry organizations. Although Columbus State is confident that its Graphic Communications Technology program currently meets business and industry needs, the faculty and administration of the college acknowledge that some foundational competencies can be delivered within a collaboratively developed secondary curriculum. The development of this Tech Prep model provides Tech Prep college students with a unique opportunity to augment a solid associate degree with advanced skills coursework that is not currently included in the program requirements, but which offers enhanced value to both program graduates and their future employers.

Columbus State Community College **Spring 1997** **Engineering Technologies Core Model**

College Pathway: Landscape Major (Architecture Technology)

May 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
ENGL 101 Beginning Composition	3	ENGL 102 Essay & Research	3	ENGL 204 Technical Writing	3	LAND 205 Landscape Plants II	4	HUM XXX Humanities	5	SSCI 1XX Social Science	5
MATH 104 Intermediate Algebra	5	MATH 148 College Algebra	5	~~LAND 107 Landscape Maintenance~~	3	LAND 206 Landscape Graphics	4	COMM 105 Speech	3	LAND 207 Landscape Structures	3
~~LAND 101 Landscape Principles~~	4	~~CPT 101 Computer Literacy I~~	3	LAND 105 Landscape Plants I	4	LAND 152 Site Planning	4	LAND 202 Landscape Design II	4	LAND 108 Landscape Garden Flowers	3
~~ARCH 111 Basic Construction Drafting~~	4	BIO 125 General Botany	5	SURV 141 Basic Surveying	4	LAND 201 Landscape Pest Control	3	LAND 203 Landscape Water/Lighting Systems	3	LAND 222 Landscape Operations	3
~~CIVL 120 Basic Construction Materials~~	3	~~ARCH 112 Construction CAD Drafting~~	3	**LAND 104 Specialty Gardens**	3	**LAND 109 Arboriculture**	3	**LAND 210 Landscape Plants III**	4	**LAND 110 Landscape Computer Applications**	3
~~CHEM 100 Introduction to Chemistry~~	4	**ARCH 113 Construction CAD Drafting II**	3	**MCT 106 Computer Literacy II**	3						
NSCI 101 Nat. Science I	5										
LAND 102 Landscape Design I	4			ARCH 291*	4						

*ARCH 291 Field Co-op Experience (4 credits) is taken in Summer Quarter between first and second year.
Struck-out courses = those that students may articulate or pass via proficiency testing.
Shaded courses = advanced skills added to the curriculum.

Heart of Ohio Tech Prep Consortium -- **Engineering Technologies Core Model** -- May 1997
Columbus State -- Landscape Major (Architecture Technology)

HIGH SCHOOL EXIT OCCUPATIONS:

- Beginning Drafter
- CAD Operator
- Landscape Crew Member
- Drafting Technician

COLLEGE EXIT OCCUPATIONS:

- Merchandiser
- Botanic Garden Manager
- Irrigation Specialist
- Landscape Design Contractor
- Arboriculture Crew Member
- Estate Grounds Manager
- Landscape Foreman
- Facilities Management Technician
- Wholesale/Retail Nursery Manager

PREREQUISITES FOR COLLEGE PORTION OF TECH PREP:

No specific prerequisites. Articulation and/or proficiency testing will determine where students will enter the program. However, in order to follow the sequence as closely as possible, students should be computer literate and proficient in algebra and geometry. High school level chemistry and physics coursework is also strongly recommended. Finally, they should have mastered the competencies during high school that are relevant to the struckout college technical courses in the college pathway table.

SUGGESTED ELECTIVES:

N/A

ADVANCED SKILLS PORTION OF TECH PREP:

Shaded courses in the college pathway table represent the advanced skills portion of the program.

EXPLANATION OF TECH PREP COURSE DIFFERENCE:

Struckout courses in the college pathway table represent those that students may articulate or pass via proficiency testing. Shaded courses represent the advanced skills portion. A student must articulate or proficiency-test out of all struckout courses in order to complete the advances skills portion of the program within the maximum 110 credit hours.

HEART OF OHIO TECH PREP CONSORTIUM
CURRICULUM PATHWAY NARRATIVE

Engineering Technologies Core Model, May 1997

Columbus State Community College
Landscape Major (Architecture Technology) Pathway

In the space below, describe the systemic change at the postsecondary level and what new options will be available for Tech Prep college students (occupational, employability, and academic).

Systemic change that will occur in the Landscape Major at Columbus State, as a result of the installation of Tech Prep pathways in the Heart of Ohio Tech Prep Consortium, include the following:

- Competencies offering additional breadth and depth to Tech Prep program completers will be possible at the postsecondary level as a result of students matriculating to Columbus State better prepared to engage in college-level work. This will help ensure that business and industry's expectations for qualified Landscape professionals are being met by increasing the time available to learn additional competencies that are being requested by employers. These competencies are represented by the pathway's advanced skills coursework (see the shaded cells in the college pathway table).

- Business and industry are seeking graduates that are broadly educated across disciplines as well as prepared specifically in the technical specialty. The Heart of Ohio Consortium's approach to designing Tech Prep models addresses these needs by prescribing cross-disciplinary, multi-disciplinary educational approaches throughout the curriculum, most intensely at the secondary level, but also occurring broadly in the postsecondary curriculum. This broad preparation optimizes program graduates' ability to be flexible, job-ready, and immediately productive upon completion of the Columbus State Tech Prep program. Graduates of the Tech Prep program are expected, as a result of their advanced skills, to enhance their employers' competitive edge in a period of rapid change in both technologies and markets.

- Qualified secondary Tech Prep students in the program will have the opportunity to begin their college experience early through the use of Post-Secondary Enrollment Options. Tech Prep models define appropriate coursework or these students to ensure a seamless pathway through the model. In addition, Columbus State departments will actively seek ways to connect with the secondary programs, their teachers, and their students, through a variety of partnerships that may include (but not be limited to) demonstrations and career talks by college personnel at the high school sites, loan or donation of equipment, team teaching of certain competencies at the high school or college site, access for Tech Prep high school classes to college facilities and equipment, opportunities for high school Tech Prep teachers to participate in and/or audit relevant college technical courses (in some cases, tuition-free), field trips to the college for prospective and actual Tech Prep students, and the like. These partnerships extend the relationships of the high schools and the college well beyond their more usual, traditional interactions.

- Articulation agreements between the Consortium's Engineering Technologies Core model/Landscape Maintenance Career Major (grades 11-12) and Columbus State's Tech Prep Landscape Major will be formalized in the coming year. This should clarify and enhance matriculation opportunities for secondary program completers into the postsecondary part of the Tech Prep model.

- Columbus State technical programs are regularly validated through ongoing business and industry surveys, as well as input from program advisory committees and adjunct faculty who are also actively employed in relevant industry organizations. Although Columbus State is confident that its Landscape Major currently meets business and industry needs, the faculty and administration of the college acknowledge that some foundational competencies can be delivered within a collaboratively developed secondary curriculum. The development of this Tech Prep model provides Tech Prep college students with a unique opportunity to augment a solid associate degree with advanced skills coursework that is not currently included in the program requirements, but which offers enhanced value to both program graduates and their future employers.

OHIO UNIVERSITY-LANCASTER

1997-98
HEART OF OHIO TECH PREP CONSORTIUM

MANUFACTURING INDUSTRIAL
TECHNOLOGY (A.A.S.)

Freshman Year Sequence

Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
IT 101 - Engineering Drawing I	**3**	**IT 102 - Engineering Drawing II**	**3**	**IT 110 - Intro to Manufacturing Process**	**4**
MATH 117 - Elementary Applied Mathematics	**4**	**MATH 118 - Elementary Applied Mathematics**	**4**	**MATH 163A - Intro to Calculus**	**4**
CHEM 121 - Principles of Chemistry	**4**	**CHEM 122 - Principles of Chemistry**	**4**	**IT 260 - Line Supervision**	**3**
ENG 151 - Freshman Composition	**5**	**PSY 101 - General Psychology**	**5**	**BA 101 - Business Environment**	**4**
				INCO 103 - Fundamentals of Public Speaking	**4**
TOTAL Credit Hours	**16**		**16**		**19**

Sophomore Year Sequence

Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
PHYS 201 - Physics: Mechanics	**4**	**PHYS 202 - Physics: Electricity/Heat/Light**	**4**	**MTCH 290 - Materials**	**3**
MTCH 261 - Manufacturing I	**3**	**MTCH 262 - Manufacturing II**	**3**	**MTCH 221 - Basic Pneumatics**	**3**
DTCH 230 - Tool Design	**4**	**MTCH 220 - Basic Hydraulics**	**3**	**MTCH 263 - Manufacturing III**	**3**
IT 115 - Metal Fabrication	**3**	**ETCH 110 - Basic Electronics**	**5**	**MTCH 264 - Manufacturing IV**	**3**
Elective	**4**			**MTCH 299 - Special Problems**	**3**
TOTAL Credit Hours	**18**		**15**		**15**

Columbus State Community College **Spring 1997** **Engineering Technologies Core Model**

College Pathway: Electro-Mechanical Engineering Technology
May 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
ENGL 101 Beginning Composition	3	MATH 112 Technical Mathematics II	4	ENGL 102 Essay & Research	3	COMM 105 Speech	3	HUM 1xx (select from Humanities options)	5	SSCI 10x (select from Social & Behavior Sciences options)	5
MATH 111 Technical Mathematics I	4	PHYS 181 Physics (Mechanics)	4	EET 130 Electronic Devices	4	PHYS 183 Technical Physics	4	ENGL 204 Technical Writing	3	MECH 240 Machine Tools	4
EET 111 DC Fundamentals	4	EET 120 AC Fundamentals	4	EET 132 Digital Fundamentals	3	EET 243 Digital Devices	4	EMEC 251 Electro-- mechanical Controls I	4	EMEC 260 Electro-mechanical Controls II	4
EET 112 DC Laboratory	2	EET 121 AC Laboratory	2	EET 131 Electronics Laboratory	2	EET 244 Digital Devices Laboratory	2	MATH 135 Elementary Statistics	5	MECH 260 Basic Mechanics	4
~~MECH 110 Introduction to Manufacturing~~	3	QUAL 120 Engineering Drawing Interpretation	3	~~MECH 120 Mechanical Drafting I~~	3	~~MECH 243 Robotics~~	3	**MECH 244 Statistical Process Control**	**3**	**MECH 262 Computer-Aided Drafting II**	**3**
EET 144 PC Hardware	**3**	~~QUAL 240 Total Quality Management~~	3	~~MECH 131 Hydraulics~~	3	EMEC 250 Motors and Controls	3	**MECH 253 Numerical Control**	**3**		

Struck-out courses = those that students may articulate or pass via proficiency testing.
Shaded courses = advanced skills added to the curriculum.

Heart of Ohio Tech Prep Consortium -- **Engineering Technologies Core Model** -- May 1997
Columbus State -- Electro-Mechanical Engineering Technology

HIGH SCHOOL EXIT OCCUPATIONS:

- Assembly Technician
- Production Expediting Clerk
- Maintenance Repairer
- Entry-Level Machinist
- Beginning Drafter
- Machine Operator
- Electrical/Electronic Assembler
- Materials Handler
- CAD Operator
- Precision Assembler
- Drafting Technician

COLLEGE EXIT OCCUPATIONS:

- Mechanical Engineering Technician
- Robotics Technician
- Maintenance Technician or Supervisor
- Industrial Engineering Technician
- Quality Machine Designer
- Production Scheduler
- CAD Operator
- Machine Programmer
- Machine Shop Supervisor
- Test Technician
- Quality Controller
- Production Engineer Technician
- Material Technologist
- Drafter-Designer
- Electronics Service Technician
- Machine Designer
- Industrial Supervisor

PREREQUISITES FOR COLLEGE PORTION OF TECH PREP:

No specific prerequisites. Articulation and/or proficiency testing will determine where students will enter the program. However, in order to follow the sequence as closely as possible, students should be computer literate and proficient in algebra and geometry. High school level chemistry and physics coursework is also strongly recommended. Finally, they should have mastered the competencies during high school that are relevant to the struckout college technical courses in the college pathway table.

SUGGESTED ELECTIVES:

N/A

ADVANCED SKILLS PORTION OF TECH PREP:

Shaded courses in the college pathway table represent the advanced skills portion of the program.

EXPLANATION OF TECH PREP COURSE DIFFERENCE:

Struckout courses in the college pathway table represent those that students may articulate or pass via proficiency testing. Shaded courses represent the advanced skills portion. A student must articulate or proficiency-test out of all struckout courses in order to complete the advances skills portionof the program within the maximum 110 credit hours.

HEART OF OHIO TECH PREP CONSORTIUM
CURRICULUM PATHWAY NARRATIVE

Engineering Technologies Core Model, May 1997

Columbus State Community College
Electro-Mechanical Engineering Technology Pathway

In the space below, describe the systemic change at the postsecondary level and what new options will be available for Tech Prep college students (occupational, employability, and academic).

Systemic change that will occur in the Electro-Mechanical Engineering Techology program at Columbus State, as a result of the installation of Tech Prep pathways in the Heart of Ohio Tech Prep Consortium, include the following:

o Competencies offering additional breadth and depth to Tech Prep program completers will be possible at the postsecondary level as a result of students matriculating to Columbus State better prepared to engage in college-level work. This will help ensure that ndustry's expectations for qualified technicians and professionals are being met by increasing the time available to learn additional competencies that are being requested by employers. These competencies are represented by the pathway's advanced skills coursework (see the shaded cells in the college pathway table).

o Business and industry are seeking graduates that are broadly educated across disciplines as well as prepared specifically in the technical specialty. The Heart of Ohio Consortium's approach to designing Tech Prep models addresses these needs by prescribing cross-disciplinary, multi-disciplinary educational approaches throughout the curriculum, most intensely at the secondary level, but also occurring broadly in the postsecondary curriculum. This broad preparation optimizes program graduates' ability to be flexible, job-ready, and immediately productive upon completion of the Columbus State Tech Prep program. Graduates of the Tech Prep program are expected, as a result of their advanced skills, to enhance their employers' competitive edge in a period of rapid change in both technologies and markets.

o Qualified secondary Tech Prep students in the program will have the opportunity to begin their college experience early through the use of Post-Secondary Enrollment Options. Tech Prep models define appropriate coursework or these students to ensure a seamless pathway through the model. In addition, Columbus State departments will actively seek ways to connect with the secondary programs, their teachers, and their students, through a variety of partnerships that may include (but not be limited to) demonstrations and career talks by college personnel at the high school sites, loan or donation of equipment, team teaching of certain competencies at the high school or college site, access for Tech Prep high school classes to college facilities and equipment, opportunities for high school Tech Prep teachers to participate in and/or audit relevant college technical courses (in some cases, tuition-free), field trips to the college for prospective and actual Tech Prep students, and the like. These partnerships extend the relationships of the high schools and the college well beyond their more usual, traditional interactions.

- Articulation agreements between the Consortium's Engineering Technologies Core model/Manufacturing Career Major (grades 11-12) and Columbus State's Tech Prep Electro-Mechanical Engineering Technology program will be formalized in the coming year. This should clarify and enhance matriculation opportunities for secondary program completers into the postsecondary part of the Tech Prep model.

- Columbus State technical programs are regularly validated through ongoing business and industry surveys, as well as input from program advisory committees and adjunct faculty who are also actively employed in relevant industry organizations. Although Columbus State is confident that its Electro-Mechanical Engineering Technology program currently meets business and industry needs, the faculty and administration of the college acknowledge that some foundational competencies can be delivered within a collaboratively developed secondary curriculum. The development of this Tech Prep model provides Tech Prep college students with a unique opportunity to augment a solid associate degree with advanced skills coursework that is not currently included in the program requirements, but which offers enhanced value to both program graduates and their future employers.

Columbus State Community College **Spring 1997**

Engineering Technologies Core Model

College Pathway: Mechanical Engineering Technology
May 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
ENGL 101 Beginning Composition	3	MATH 112 Technical Mathematics II	4	ENGL 102 Essay & Research	3	ENGL 204 Technical Writing	3	HUM 1xx (select from Humanities options)	5	SSCI 10x (select from Social & Behavior Sciences options)	5
MATH 111 Technical Mathematics I	4	PHYS 181 Physics (Mechanics)	4	COMM 105 Speech	3	MECH 241 Mechanical Drafting II	3	MECH 250 Materials Science	3	MECH 260 Basic Mechanisms	4
~~MECH 110 Introduction to Manufacturing~~	3	~~EET 101 Basic Electricity~~	3	MATH 113 Technical Mathematics III	4	MECH 240 Machine Tools	4	MECH 252 Computer Programming for Technicians	3	MECH 261 Tool Machine Design	4
~~MECH 111 Manufacturing Processes~~	4	~~MECH 120 Mechanical Drafting I~~	3	EET 102 Electronic/ Digital Fundamentals	3	~~MECH 251 Computer Aided Drafting I~~	3	MECH 253 Numerical Control	3	MECH 262 Computer-Aided Drafting II	3
MECH 112 Computer Applications in Manufacturing	3	~~QUAL 240 Total Quality Management~~	3	~~MECH 131 Hydraulics~~	3	MECH 242 Strength of Materials	3	MECH 244 Statistical Process Control	3	MECH 263 Computer-Aided Manufacturing	4
		EMEC 250 Motors and Controls	3	MECH 130 Statics	3	~~MECH 243 Robotics~~	3	**EMEC 251 Electro--mechanical Controls I**	4	**MECH 2XX Advanced Computer-Aided Drafting**	4
										EMEC 260 Electro-mechanical Controls II	4

Struck-out courses = those that students may articulate or pass via proficiency testing.
Shaded courses = advanced skills added to the curriculum.

Columbus State -- Mechanical Engineering Technology

HIGH SCHOOL EXIT OCCUPATIONS:

Assembly Technician
Production Expediting Clerk
Maintenance Repairer
Entry-Level Machinist
Beginning Drafter
Machine Operator
Electrical/Electronic Assembler
Materials Handler
CAD Operator
Precision Assembler
Drafting Technician

COLLEGE EXIT OCCUPATIONS:

Mechanical Engineering Technician
Robotics Technician
Maintenance Technician or Supervisor
Industrial Engineering Technician
Quality Machine Designer
Production Scheduler
CAD Operator
Machine Programmer
Machine Shop Supervisor
Test Technician
Quality Controller
Production Engineer Technician
Material Technologist
Drafter-Designer
Electronics Service Technician
Machine Designer
Industrial Supervisor

PREREQUISITES FOR COLLEGE PORTION OF TECH PREP:

No specific prerequisites. Articulation and/or proficiency testing will determine where students will enter the program. However, in order to follow the sequence as closely as possible, students should be computer literate and proficient in algebra and geometry. High school level chemistry and physics coursework is also strongly recommended. Finally, they should have mastered the competencies during high school that are relevant to the struckout college technical courses in the college pathway table.

SUGGESTED ELECTIVES:

N/A

ADVANCED SKILLS PORTION OF TECH PREP:

Shaded courses in the college pathway table represent the advanced skills portion of the program.

EXPLANATION OF TECH PREP COURSE DIFFERENCE:

Struckout courses in the college pathway table represent those that students may articulate or pass via proficiency testing. Shaded courses represent the advanced skills portion. A student must articulate or proficiency-test out of all struckout courses in order to complete the advances skills portion of the program within the maximum 110 credit hours.

HEART OF OHIO TECH PREP CONSORTIUM
CURRICULUM PATHWAY NARRATIVE

Engineering Technologies Core Model, May 1997

Columbus State Community College
Mechanical Engineering Technology Pathway

In the space below, describe the systemic change at the postsecondary level and what new options will be available for Tech Prep college students (occupational, employability, and academic).

Systemic change that will occur in the Mechanical Engineering Technology program at Columbus State, as a result of the installation of Tech Prep pathways in the Heart of Ohio Tech Prep Consortium, include the following:

- Competencies offering additional breadth and depth to Tech Prep program completers will be possible at the postsecondary level as a result of students matriculating to Columbus State better prepared to engage in college-level work. This will help ensure that business and industry's expectations for qualified technicians and professionals are being met by increasing the time available to learn additional competencies that are being requested by employers. These competencies are represented by the pathway's advanced skills coursework (see the shaded cells in the college pathway table).

- Business and industry are seeking graduates that are broadly educated across disciplines as well as prepared specifically in the technical specialty. The Heart of Ohio Consortium's approach to designing Tech Prep models addresses these needs by prescribing cross-disciplinary, multi-disciplinary educational approaches throughout the curriculum, most intensely at the secondary level, but also occurring broadly in the postsecondary curriculum. This broad preparation optimizes program graduates' ability to be flexible, job-ready, and immediately productive upon completion of the Columbus State Tech Prep program. Graduates of the Tech Prep program are expected, as a result of their advanced skills, to enhance their employers' competitive edge in a period of rapid change in both technologies and markets.

- Qualified secondary Tech Prep students in the program will have the opportunity to begin their college experience early through the use of Post-Secondary Enrollment Options. Tech Prep models define appropriate coursework or these students to ensure a seamless pathway through the model. In addition, Columbus State departments will actively seek ways to connect with the secondary programs, their teachers, and their students, through a variety of partnerships that may include (but not be limited to) demonstrations and career talks by college personnel at the high school sites, loan or donation of equipment, team teaching of certain competencies at the high school or college site, access for Tech Prep high school classes to college facilities and equipment, opportunities for high school Tech Prep teachers to participate in and/or audit relevant college technical courses (in some cases, tuition-free), field trips to the college for prospective and actual Tech Prep students, and the like. These partnerships extend the relationships of the high schools and the college well beyond their more usual, traditional interactions.

- Articulation agreements between the Consortium's Engineering Technologies Core model/Mechanical & Manufacturing Engineering Technologies Career Major (grades 11-12) and Columbus State's Tech Prep Mechanical Engineering Technology program will be formalized in the coming year. This should clarify and enhance matriculation opportunities for secondary program completers into the postsecondary part of the Tech Prep model.

- Columbus State technical programs are regularly validated through ongoing business and industry surveys, as well as input from program advisory committees and adjunct faculty who are also actively employed in relevant industry organizations. Although Columbus State is confident that its Mechanical Engineering Technology program currently meets business and industry needs, the faculty and administration of the college acknowledge that some foundational competencies can be delivered within a collaboratively developed secondary curriculum. The development of this Tech Prep model provides Tech Prep college students with a unique opportunity to augment a solid associate degree with advanced skills coursework that is not currently included in the program requirements, but which offers enhanced value to both program graduates and their future employers.

HEART of OHIO TECH PREP CONSORTIUM
1997

Engineering Technologies Core Model

PART II.A:
Secondary Technical
Competencies (Unleveled)

Heart of Ohio Tech Prep Consortium

Engineering Technologies

Engineering Core (Jr.)
Mechanical/Manufacturing Engineering Technology
Graphics Communication Engineering Technology
Landscape/Design Build Engineering Technology
Design Engineering Technology
Electronics Engineering Technology
Architectural/Civil Construction Technologies

Heart of Ohio Tech Prep Consortium
Central Office, c/o Columbus State Community College
550 E. Spring Street, Columbus, Ohio 43215
614-227-2452

Ohio University--Lancaster
Lancaster, Ohio
614-837-0959 x 216

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    Total Quality Management (TQM) 14
    Production Processes 15
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    Mechanical CAD Drafting 27
    Robotics 33
    Hydraulics & Pneumatics 35

Graphic Communications Engineering Technology 36
    Mechanical CAD Drafting 36
    Black and White Photography 42
    Introduction to Computer Graphics 44
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Landscape/Design Build Engineering Technology 51
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Design Engineering Technology 68
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    Basic Construction Materials 77
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Electronics CAD Drafting 81
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Heart of Ohio Tech Prep Consortium

Columbus State Community College and
Ohio University/Lancaster

Engineering Technologies

JUNIOR ACADEMIC COURSES

Communications (competencies target preparing students to place into English 111)
*Math--Geometry
Chemistry

TECHNICAL COURSES

Junior Core Curriculum

Computer Literacy

Career Exploration

Drafting/CAD Fundamentals Technology

Safety Practices

Basic Electricity/Electronics

Introduction to Total Quality Management

Production Processes

Employability Skills

*Recommended academic
Lab = 150 minutes (100 minutes for technical + 50 minutes for academic competencies)
The junior core would be taught to all pre-engineering students regardless of senior technical options.
Course credit at OU/Lancaster will be determined by proficiency exams.
A mentorship experience is recommended as an option/elective at either junior or senior year.
Safety Practices partically fulfills competencies in AUTO 062.

SENIOR ACADEMIC COURSES

- Communications (competencies target preparing students to place into English 111)
- Math--Algebra II
- *Physics

SENIOR ELECTIVE TECHNICAL CAREER MAJORS**

- CAD I (Intermediate)

Mechanical/Manufacturing Engineering Technology (Junior--Geometry and Senior--Physics)

- Mechanical CAD Drafting
- Robotics
- Hydraulics

Graphics Communications (Junior--Geometry and Senior--Physics)

- Mechanical CAD Drafting
- Black & White Photography
- Introduction to Computer Graphics Macintosh
- Electronic Publishing
- Computer Graphics Illustrations
- Introduction to Multimedia (Proposed Course Fall)

Landscape/Design Buid Engineering Technology (Junior--Geometry and Senior--Physics)

- Construction CAD Drafting
- Landscape Space Principles
- Basic Construction Materials
- Landscape Design
- General Safety Precautions

Design Engineering Technology (Junior--Algebra II and Senior--Trigonometry)

- Mechanical/Electronics CAD Drafting
- Applied Trigonometry
- Applied Physics
- Basic Construction Materials
- Engineering Mechanics

Electronics Engineering Technology (Junior--Algebra II and Senior--Tech Math 1)

- Mechanical/Electronics CAD Drafting
- DC Fundamentals
- DC Laboratory
- PC Hardware

Architectural/Civil Construction (Junior --Algebra II and Senior Physics)

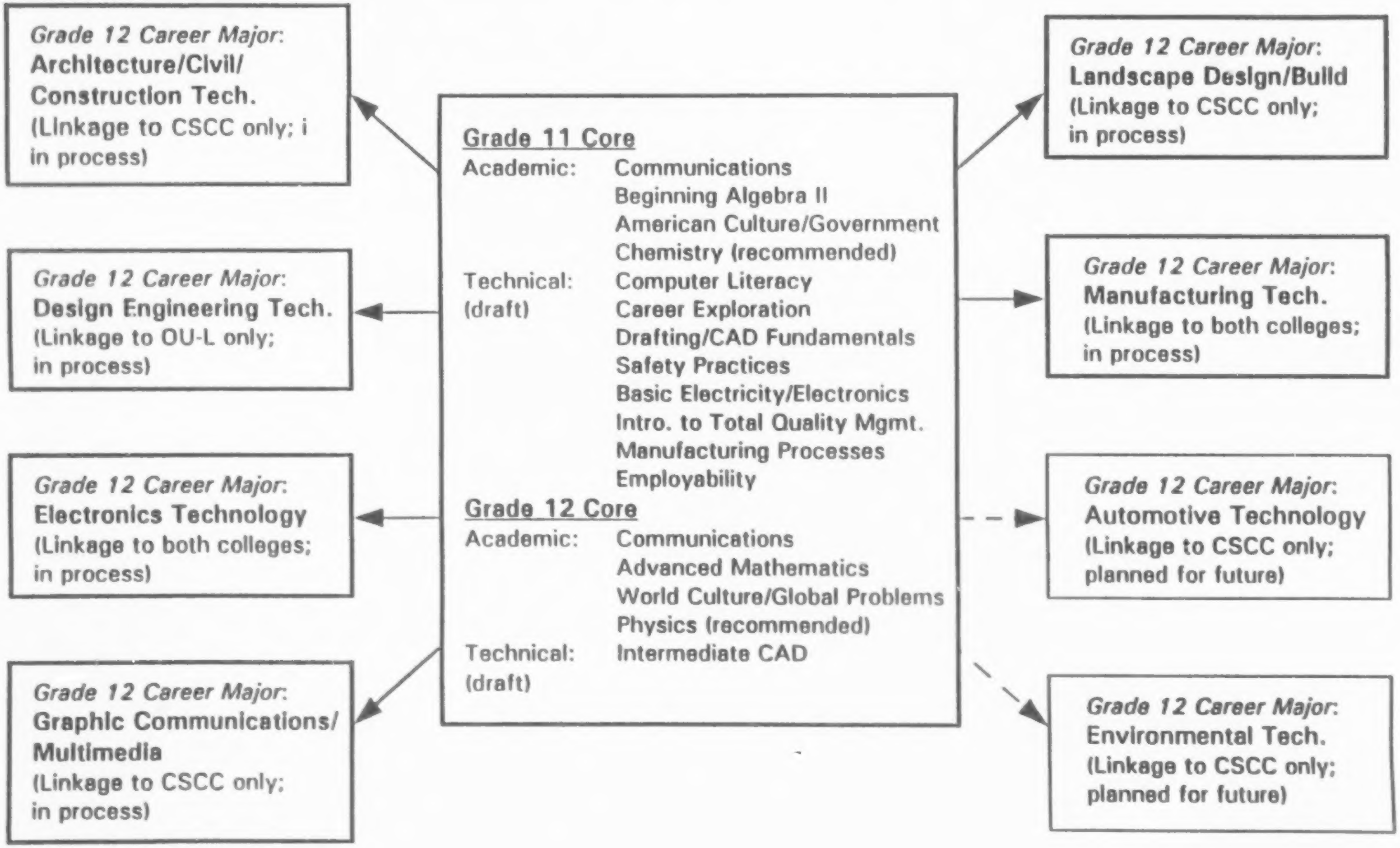
- Construction CAD Drafting
- Construction Materials
- Construction Industry Survey
- Construction Contract Documents
- Building Construction Drawings

CAD is the senior technical core. PSEO is a viable senior option.

**A school would offer two/three courses within one of the technical course options. Additional technical options could be developed by other school districts.

ENGINEERING TECHNOLOGIES CORE MODEL

Rev. Draft, 1/10/97



Grade 11 Core

Academic:
- Communications
- Beginning Algebra II
- American Culture/Government
- Chemistry (recommended)

Technical: (draft)
- Computer Literacy
- Career Exploration
- Drafting/CAD Fundamentals
- Safety Practices
- Basic Electricity/Electronics
- Intro. to Total Quality Mgmt.
- Manufacturing Processes
- Employability

Grade 12 Core

Academic:
- Communications
- Advanced Mathematics
- World Culture/Global Problems
- Physics (recommended)

Technical: (draft)
- Intermediate CAD

Grade 12 Career Major:
Architecture/Civil/ Construction Tech.
(Linkage to CSCC only; i in process)

Grade 12 Career Major:
Design Engineering Tech.
(Linkage to OU-L only; in process)

Grade 12 Career Major:
Electronics Technology
(Linkage to both colleges; in process)

Grade 12 Career Major:
Graphic Communications/ Multimedia
(Linkage to CSCC only; in process)

Grade 12 Career Major:
Landscape Design/Build
(Linkage to CSCC only; in process)

Grade 12 Career Major:
Manufacturing Tech.
(Linkage to both colleges; in process)

Grade 12 Career Major:
Automotive Technology
(Linkage to CSCC only; planned for future)

Grade 12 Career Major:
Environmental Tech.
(Linkage to CSCC only; planned for future)

NOTE: Aviation Maintenance Technology at Columbus State may be accessed through a technical articulation agreement; however no Tech Prep linkage is feasible.

coremodl.ppt

Computer Literacy

MECH 112

LEVEL		11	12	AD	WS	LL
Competency: Perform computer operations						
Competency Builders:						
	Explain how data is stored in main computer memory					
	Explain how a computer system executes program instructions					
	Explain computer storage capacity					
	Explain how data is represented					
	Describe data storage techniques					
	Identify types of memory					
	Explain PC layouts					
	Differentiate between hardware and software					
	Differentiate open and proprietary architecture					
	Practice proper media handling techniques (e.g., magnetic fields, dust, liquids)					
	Use hardware (e.g., mouse, diskettes, drive, modems, touch screen, printers, digitizers, scanners, cables, protection devices)					
	Demonstrate basic care of hardware					
	Perform basic hardware troubleshooting					
	Describe and access computer help files					
Competency: Describe the operation of computer system software						
Competency Builders:						
	Define operating systems (e.g., DOS, OS/2, UNIX, MAC, WINDOWS)					
	Describe computer languages and their use					
	Describe differences between data files and program files					
	Define software types and functions					
	Describe basic disk operations and care					
	List advantages and disadvantages of integrated and dedicated software					
	Use knowledge of DOS to reconstruct files that are deleted or damaged					
	Install/reinstall system software					
	Perform basic software troubleshooting					

LEVEL		11	12	AD	WS	LL
Competency: Operate computer software						
Competency Builders:						
	Install computer software					
	Configure computer software					
	Operate diagnostic software					
	Keyboard efficiently					
	Demonstrate basic proficiency in spreadsheet use in solving simple engineering problems					
	Demonstrate basic proficiency in word processing					
	Demonstrate basic proficiency in database use					
	Demonstrate basic proficiency in network use					
	Demonstrate basic proficiency in utility (e.g., Windows, GUI)					
	Demonstrate basic proficiency in report writing					
	Demonstrate system commands					
	Use electronic mail/world-wide web					
Competency: Demonstrate the use of computer security						
Competency Builders:						
	Explain need for and application of security levels/procedures					
	Describe ethical use/misuse of software					
	Use bulletin boards/electronic mail/internet security					
	Apply security levels/procedures while handling sensitive data					
	Explain data compression					
	Use and delete passwords					
	Explain virus/virus protection techniques					

Career Exploration MECH 110						
LEVEL		**11**	**12**	**AD**	**WS**	**LL**
Competency: Explore engineering careers						
Competency Builders:						
	Explain the engineering team concept					
	Differentiate among engineer, engineering technologist, and engineering technician					
	Explore available career opportunities within engineering technologies					
	Define the preparation required for engineer, engineering technologist, and engineering technician					
	Explain manufacturing, design, construction practices, and their significance from historical, contemporary and future prospective					
Competency: Explore potential engineering technology career paths						
Competency Builders:						
	Define the make-up of basic business enterprises (includes proprietorships through government agencies)					
	Explore the role of professional and technical societies					
	Describe opportunities for career advancement					
	Describe additional educational and/or training opportunities					

Drafting/CAD Fundamentals

LEVEL		11	12	AD	WS	LL
Competency: Introduction to mechanical drafting						
Competency Builders:						
	Describe the need for the "language" of drafting					
	Describe the typical drafting department					
	Demonstrate the use of drafting equipment and supplies					
	Identify line styles and weights (alphabet of lines)					
	Operate a blue line print machine					
	Develop basic drafting skills					
	Demonstrate lettering techniques					
	Demonstrate proper line techniques					
Competency: Correctly setup and use manual drafting tools to produce a quality drawing						
Competency Builders:						
	Clean, maintain and adjust the parallel bar or drafting machine					
	Lay down and align a sheet of drafting vellum on the work surface ready for drafting					
	Use a sand pad for sharpening lead compass points and/or a pencil pointer for sharpening lead holder points					
	List the various hardness of graphite leads and corresponding numbers					
	Use the Ames Lettering Guide to produce guidelines for consistent free-hand letter heights					
	Maintain and use the compass to produce circular curves and ellipses					
	Maintain lead holders and utilize the proper rotational method to maintain a conical point when drawing lines					
	Identify the units on an Architect's scale and use the scale to lay out dimensions on a drawing					
	Identify the units on an Engineer's scale and use the scale to lay out dimensions on a drawing					
Competency: Develop a consistent free-hand (letter height, spacing and legibility) lettering style						
Competency Builders:						
	Apply the appropriate lettering sizes to dimensions					
	Apply the appropriate lettering sizes to notes					
	Apply the appropriate lettering sizes to sub-titles					
	Apply the appropriate lettering sizes to titles					

Competency: Develop basic sheet elements and draw simple geometric constructions						
Competency Builders:						
	Pre-plan a sheet for optimum placement of drawings and for space usage on the sheet					
	Develop borders and title blocks					
	Draw lines at 15° increments radiating from a central point using a combination the 45° and the 30°-60° triangles					
	Use circle templates, and irregular or adjustable curves to produce arcs, spirals and irregular lines					
	Construct geometric shapes including, circles, polygons and non-regular shapes					
Competency: Draw and dimension orthographic projections						
Competency Builders:						
	Define drafting terminology (i.e., reference planes, etc.)					
	Sketch orthographic views					
	Draw single-view drawings orthographic drawings					
	Draw two-view orthographic drawings					
	Draw multi-view projections from pictorial drawings and/or actual mechanical parts					
	Identify and properly draw various line from the alphabet of lines					
	Use a CAD system to draw and dimension orthographic drawings					
Competency: Explain and illustrate the relationships of view in orthographic projection						
Competency Builders:						
	Develop two dimensional (orthographic views) from three dimensional object, including straight, curved surfaces, and oblique surfaces					
	Generate auxiliary view of oblique surfaces to develop true size and shapes of planes					
	Reproduce a simple floor plan at an appropriate scale using proper line weights to identify full height and lesser walls, built-in items, and fixtures					

Competency: Use the current industry standard method of dimensioning and referencing drawings						
Competency Builders:						
	Use datum elevation bullets for height notations on elevations and sections					
	Apply the correct scale to various types of drawings; i.e., site plans, floor plans, elevations and sections cuts					
	Use various line weights (widths) to convey the illusion of depth, distance or separation					
	Use common architectural dimensioning system, including continuous dimension strings					
Competency: Demonstrate basic use of computer operating system						
Competency Builders:						
	Create ASCII text files with a text editor					
	Explain rules for naming files and directories					
	Manage files					
	Create directories					
	Remove directories					
	Change directories					
	Copy files					
	Rename files					
	Erase files					
	Format diskettes					
	Label diskettes					
	Explain the syntax of operating system commands					
	Use wild-cards in operating system commands					
Competency: Describe the inter-relationship of computer hardware and software comprising a CAD drafting system						
Competency Builders:						
	List and describe the hardware components necessary to support CAD drafting system					
	Describe the inter-relationship of the software comprising the CAD drafting system and differentiate between the operating system the applications software					
	Use the operating system to format storage devices (diskettes) to save files and to enter and exit the CAD application program; be familiar with file utility command for creating a new drawing, opening an existing file and ending a drawing session					

	Identify the various components depicted on the graphics screen, i.e., pull down menus, icons, and dialogue boxes; use the mouse (puck) to pick, enter (accept), and cancel from the screen or tablet					
	Compare and contrast the organization, elements (font size, dimensioning practices and sheet organization) and drawing setup procedures for manual drafting and CAD drafting					
	Use the function keys to control graphic screen actions					
Competency: Describe the function of and use the drawing commands in a CAD system to set up and create a drawing						
Competency Builders:						
	Describe and use the drawing units commands involving unit settings, layers, scaling and line types to create a proto-type drawing					
	Describe and use the drawing commands involving lines polylines, circles arcs, ellipses and regular polygon shapes to create borders on a proto-type drawing					
	Describe standard drawing for formats and use the layering system to produce multiple drawings from a common "seed" file					
Competency: Apply CAD skills						
Competency Builders:						
	Identify line styles and weights (alphabet of lines)					
	Select proper drawing scale					
	Prepare title blocks and other drafting formats					
	Prepare orthographic views					
	Prepare and describe change control block/revision block					
	Measure angles					
	Draw horizontal, vertical, angular, parallel, and perpendicular lines					
	Transfer an angle					
	Construct tangent lines (to arcs) and tangent arcs (to arcs)					
	Bisect angles and arcs					
	Bisect lines					
	Divide lines					

Competency: Describe the function of and use CAD system editing commands to modify and accelerate the drawing process						
Competency Builders:						
	Describe and use the editing commands to zoom, pan, oops, redraw/regenerate undo, erase, redo and set the view resolution to create and edit drawings					
	Describe and use the editing commands to offset, trim and extend lines and to create fillets at the intersection of lines					
	Describe and use the editing commands involving movings, copying, scaling, rotating, breaking and stretching to modify the drawing; use the array and mirroring command to accelerate the drawing					
	Describe and use the editing commands involving dividing, exploding and measuring lines					
Competency: Draw working drawings						
Competency Builders:						
	Draw auxiliary views					
	Draw sectional views					
	Complete title blocks and revision charts					
	Calculate tolerances and include on drawings					
	Use a CAD system to draw/dimension working drawings					
Competency: Construct pictorial drawings						
Competency Builders:						
	Sketch pictorial drawings					
	Draw oblique drawings					
	Draw isometric projects from orthographic views					
	Complete a perspective drawing					
	Use a CAD system to draw pictorials					

Competency: Apply commonly used CAD commands						
Competency Builders:						
	Describe and use the object snaps, selection settings, and precision inputs to control the drawing process					
	Describe and use the inquiry commands to check the drawing					
	Describe and use the text commands to create text styles, set text size, annotate and correctly place text in the drawing					
	Describe and use dimensioning commands to establish dimension accuracy, settings and positioning of dimensions on the architectural floor plan of a small office building					

Safety Practices

(Core items only. Does not include career major specific items.)

LEVEL		11	12	AD	WS	LL
Competency: Apply workplace safety rules and procedures						
Competency Builders:						
	Identify personal protective wear and equipment					
	Identify visual controls (e.g., monitors, read outs)					
	Identify auditory controls					
	Use personal protective wear and equipment					
	Apply fire safety rules and procedures					
	Apply hazardous wastes rules and procedures					
	Apply workplace safety rules and procedures					
	Apply workplace organization (e.g., housekeeping)					
	Apply applicable electrical, mechanical, steam, hydraulic and other (e.g., pneumatic) safety rules and procedures					
Competency: Apply basic first aid						
Competency Builders:						
	Identify need and procedure for reporting accidents					
	Identify and apply basic first aid rules and procedures					
	Maintain first aid kit					
Competency: Demonstrate knowledge of ergonomics						
Competency Builders:						
	Define ergonomics					
	Define risk factor					
	Define cumulative trauma disorder (CTD)					
	Minimize repetitive tasks					
	Minimize awkward body positions					
	Explain use of rest pauses					
	Explain need for appropriate working heights of chairs, stools, workbenches, equipment					
	Explain need for adequate lighting					

Competency: Maintain safe work environment						
Competency Builders:						
	Follow safety procedures according to Occupational Safety and Health Administration (OSHA) Guidelines					
	Wear eye protection when instructed					
	Follow lab rules					
	Demonstrate proper handling of hazardous substances					
	Identify, use and care for handtools					
	Demonstrate the location and function of the emergency power kill switch					
	Demonstrate proper emergency action techniques					

Basic Electricity/Electronics
EET 101

LEVEL		11	12	AD	WS	LL
Competency: Identify and describe basic electrical systems, components and theories						
Competency Builders:						
	Identify various sources of electricity	I/M	R	R		
	Describe atomic structure (its relationships to electricity)					
	Identify electrical components					
	Apply Ohms's law					
	Safely and accurately measure voltage, resistance and current					
	Create and interpret basic electrical schomatics					
Competency: Apply the elements of physics that pertain to direct current		I	M	R		
Competency Builders:						
	Demonstrate the ability to use scientific notation					
	Solve problems of conversion using both metric and English measuring systems					
	Solve problems involving the inter-relationship of basic electrical units and the application of scientific notation					
	Describe atomic theory and the relationship of conductance to atomic structure					
	Describe what makes certain materials good conductors, insulators, and semi-conductors					
	Solve problems using the inter-relationship of current, voltage, and resistance					
	Describe the application of various sources of electrical energy					
Competency: Construct DC circuits		I	M	R		
Competency Builders:						
	Determine resistor values					
	Construct and analyze simple DC circuits					
	Construct and analyze series DC circuits					
	Construct and analyze parallel DC circuits					
	Construct and analyze series-parallel circuits					
	Use a DC motor					

Competency: Construct AC circuits		I	M	R		
Competency Builders:						
	Describe the function of a transformer					
	Construct and analyze simple AC circuits					
	Construct and analyze series AC circuits					
	Construct and analyze parallel AC circuits					
	Construct and analyze series-parallel circuits					
	Solve inductive and capacitive reactance problems					
	Use an AC motor					
Competency: Control circuits		I	R	M		
Competency Builders:						
	Rate batteries					
	Identify typical control components					
	Read and interpret schematics and control diagrams					
	Connect motor to control circuits					
	Connect programmable controls to circuits					
	Program programmable controller					
	Troubleshoot circuits					
Competency: Analyze and measure characteristics of diodes and basic power supplies		I	M	R		
Competency Builders:						
	Examine PN junctions					
	Examine diode characteristics					
	Evaluate limiters and clampers					
	Analyze half wave, full wave, and bridge rectifiers					
	Examine nonregulated power supplies					
	Examine zeneer diodes					
	Adapt thermistors and varistors					
	Examine characteristics of light-emitting diodes (LED)					

Total Quality Management (TQM)

QUAL 240

LEVEL		11	12	AD	WS	LL
Competency: Explain the history of Total Quality Management (TQM)						
Competency Builders:						
	Identify major phases in the history of quality and describe their characteristics					
	Describe and compare the philosophies and principles of gurus in quality, including Deming, Juran, Crosby, Ishikawa, Shewhart, and Taguchi					
Competency: Describe the implementation of Total Quality Management (TQM)						
Competency Builders:						
	Describe factors which influence change in organizations and the importance of management by data and systems for continuous improvement in quality					
	Differentiate leadership from management and describe the characteristics of principle centered leaders and empowerment					
	Describe structures conducive to TQM (including Malcolm Baldridge, ISO-9000 and the Deming prize)					
	Identify customers, suppliers and their expectations					
	Identify methods for improving customer and supplier relations					
	Describe the mission and composition of quality improvement teams					
	Describe the mission and composition of process improvement teams					
	Describe why some TQM programs fail					
	Describe the future of TQM					
	Implement TQM concepts					
Competency: Apply effective team practice to support quality						
Competency Builders:						
	Choose a leader					
	Divide work					
	Determine roles and responsibilities					
	Demonstrate practices for reaching consensus (e.g., nominal group practice, balloting, focus groups)					
	Write job descriptions					
	Enforce accountability					

Production Processes MECH 111						
LEVEL		**11**	**12**	**AD**	**WS**	**LL**
Competency: Apply basic manufacturing skills						
Competency Builders:						
	Describe atomic structure					
	Describe the nature of common manufacturing materials					
	Describe the organization of modern manufacturing plants					
	Describe and demonstrate the casting and molding of metal materials					
	Describe and demonstrate the casting and molding of plastic materials					
	Describe and demonstrate the hot and cold forming of metal materials					
	Describe and demonstrate the hot and cold forming of plastic materials					
	Describe and demonstrate the hot and cold forming of ceramic materials					
	Describe and demonstrate the hot and cold forming of powdered metal materials					
	Describe and demonstrate the welding of materials					
	Describe and demonstrate adhesive techniques					
	Describe and demonstrate mechanical fastening techniques					
Competency: Demonstrate safe machining techniques						
Competency Builders:						
	Demonstrate turning operations					
	Demonstrate milling operations					
	Demonstrate sawing operations					
	Demonstrate broaching operations					
	Demonstrate filing operations					
	Demonstrate drilling operations					
	Demonstrate boring operations					
	Demonstrate reaming operations					
	Demonstrate tapping operations					
	Demonstrate abrasion machining operations					
	Demonstrate chemical machining operations					
	Demonstrate thermal machining operations					

LEVEL		11	12	AD	WS	LL
Competency: Demonstrate modern manufacturing plant techniques						
Competency Builders:						
	Design a manufacturing assembly line					
	Implement a manufacturing assembly line					
	Evaluate a manufacturing assembly line					

Employability Skills

Career Development						
LEVEL		**11**	**12**	**AD**	**WS**	**LL**
Competency: Investigate career options						
Competency Builders:						
	Determine interests and aptitudes					
	Identify career options					
	Research interests, knowledge, abilities, and skills needed in an occupations					
	Select careers that best match interests and aptitudes					
	Identify advantages and disadvantages of career options, including self-employment and nontraditional careers					
Competency: Utilize career information						
Competency Builders:						
	Identify a range of career information resources					
	Use a range of resources to obtain career information (e.g., handbooks, career materials, labor market information, and computerized career-information delivery systems)					
	Demonstrate knowledge of various classification systems that categorize occupations and industries (e.g., *Dictionary of Occupational Titles*)					
	Describe the educational requirements of various occupations					
	Identify individuals in selected occupations as possible information resources, role models, or mentors					
	Describe the impact of factors such as population, climate, employment trends, and geographic location on occupational opportunities					
	Assess differences in the wages, benefits, annual incomes, cost of living, and job opportunities associated with selected career options					
	Determine labor market projections for selected career options					
Competency: Participate in a career exploration activity						
Competency Builders:						
	Identify career exploration activities (e.g., job shadowing, mentoring, volunteer experiences, part-time employment, and cooperative education)					
	Compare traits, skills, and characteristics required for specific career choices with individual's traits, skills, and characteristics					
	Recognize potential conflicts between personal characteristics and career choice areas					
	Describe the impact of exploration activities on current career choices					

Competency: Assess the relationship between educational achievement and career planning						
Competency Builders:						
	Describe how skills developed in academic and vocational programs relate to career goals					
	Describe how education relates to the selection of a college major, further training, and/or entry into the job market					
	Identify skills that can apply to a variety of occupational requirements					
	Explain the importance of possessing learning skills in the workplace					
Competency: Develop an individual career plan						
Competency Builders:						
	Identify career goal(s)					
	Identify worker conditions, education, training, and employment opportunities related to selected career goal(s)					
	Describe school and community resources available to help achieve career goal(s)					
	Identify career ladders possible within selected career goal(s)					
	Identify additional experiences needed to move up identified career ladders*					
	Recognize that changes may require retraining and upgrading of employees' skills					
Competency: Annually review/revise the individual career plan						
Competency Builders:						
	Identify experiences that have reinforced selection of the specific career goal(s) listed on the individual career plan					
	Identify experiences that have changed the specific career goal(s) listed on the individual career plan					
	Modify the career goal(s) and educational plans on the individual career plan					
	Ensure that parents or guardians provide input into the individual career plan process					
	Identify the correlation between the individual career plan and the actual courses to be taken in high school					
	Identify the correlation between the individual career plan and postsecondary training, adult education, or employment					
Decision Making and Problem Solving						
Competency: Apply decision-making techniques in the workplace						
Competency Builders:						
	Identify the decision to be made					
	Compare alternatives					

	Determine the consequences of each alternative					
	Make decisions based on values and goals					
	Evaluate the decision made					
Competency: Apply problem-solving techniques in the workplace						
Competency Builders:						
	Diagnose the problem, its urgency, and its causes					
	Identify alternatives and their consequences in relation to the problem					
	Recognize multicultural and nonsexist dimensions of problem solving					
	Explore possible solutions to the problem using a variety of resources					
	Compare/contrast the advantages and disadvantages of each solution					
	Determine appropriate action					
	Implement action					
	Evaluate results of action implemented					
Work Ethic						
Competency: Evaluate the relationship of self-esteem to work ethic						
Competency Builders:						
	Identify special characteristics and abilities in self and others					
	Identify internal and external factors that affect self-esteem					
	Identify how individual characteristics relate to achieving personal, social, educational, and career goals					
	Identify the relationship between personal behavior and self-concept					
Competency: Analyze the relationship of personal values and goals to work ethic both in and out of the workplace						
Competency Builders:						
	Distinguish between values and goals					
	Determine the importance of values and goals					
	Evaluate how one's values affect one's goals					
	Identify own short- and long-term goals					
	Prioritize own short- and long-term goals					
	Identify how one's values are reflected in one's work ethic					
	Identify how interactions in the workplace affect one's work ethic					
	Identify how life changes affect one's work ethic					
Competency: Demonstrate work ethic						
Competency Builders:						
	Examine factors that influence work ethic					
	Display initiative					
	Demonstrate dependable attendance and punctuality					

	Demonstrate organizational skills					
	Adhere to schedules and deadlines					
	Demonstrate a willingness to learn					
	Demonstrate a willingness to accept feedback and evaluation					
	Demonstrate interpersonal skills required for working with and for others					
	Describe appropriate employer-employee interactions for various situations					
	Express feelings and ideas in an appropriate manner for the workplace					
Job Seeking						
Competency: Prepare for employment						
Competency Builders:						
	Identify traditional and nontraditional employment sources					
	Utilize employment sources					
	Research job opportunities, including nontraditional careers					
	Interpret equal employment opportunity laws					
	Explain the critical importance of personal appearance, hygiene, and demeanor throughout the employment process					
	Prepare for generic employment tests and those specific to an occupation/organization					
Competency: Develop a resume						
Competency Builders:						
	Identify personal strengths and weaknesses					
	List skills and/or abilities, career objective(s), accomplishments/achievements, educational background, work experience, volunteer/community contributions, and organizational memberships					
	Select an acceptable resume format					
	Use correct grammar and spelling and concise wording					
	Secure references					
	Complete the resume					
Competency: Complete the job application process						
Competency Builders:						
	Explain the importance of an application form					
	Obtain the job application form					
	Demonstrate appropriate behaviors (e.g., personal appearance, hygiene, and demeanor) for obtaining job application forms in person					
	Describe methods for handling illegal questions on job application forms					
	Demonstrate legible written communication skills using correct grammar and spelling and concise wording					
	Return application to appropriate person					
	Request interview					

	Follow up on application status					
Competency: Demonstrate interviewing skills						
Competency Builders:						
	Investigate interview procedures					
	Demonstrate appropriate behaviors (e.g., appearance, hygiene, and demeanor) for the interview					
	Demonstrate question-and-answer techniques					
	Demonstrate methods for handling difficult and/or illegal interview questions					
	Use correct grammar and concise wording					
Competency: Secure employment						
Competency Builders:						
	Identify present and future employment opportunities within an occupation/organization					
	Research the organization/company					
	Use follow-up techniques to enhance employment potential					
	Evaluate job offer(s)					
	Respond to job offer(s)					
Job Retention and Career Advancement Skills						
Competency: Analyze the organizational structure of the workplace						
Competency Builders:						
	Identify employer expectations regarding job performance, work habits, attitudes, personal appearance, and hygiene					
	Comply with company policies and procedures					
	Examine the role/relationship between employee and employer					
	Recognize opportunities for advancement and reasons for termination					
	Recognize the organization's ethics					
Competency: Maintain positive relations with others						
Competency Builders:						
	Exhibit appropriate work habits and attitudes					
	Identify behaviors for establishing successful working relationships					
	Cooperate through teamwork and group participation					
	Demonstrate a willingness to compromise					
	Identify methods for dealing with harassment, bias, and discrimination based on race, color, national origin, gender, religion, disability, or age					
	Cooperate with authority					
	Accept supervision					
Competency: Demonstrate accepted social and work behaviors						
Competency Builders:						
	Demonstrate a positive attitude					

	Demonstrate accepted conversation skills					
	Use good manners					
	Accept responsibility for assigned tasks					
	Demonstrate personal hygiene					
	Demonstrate knowledge of a position					
	Perform quality work					
Competency: Analyze opportunities for personal and career growth*						
Competency Builders:						
	Determine opportunities within chosen occupation/organization					
	Determine other career opportunities outside chosen occupation/organization					
	Evaluate the factors involved in considering a new position within or outside an occupation/organization					
	Exhibit characteristics needed for advancement					
Technology in the Workplace						
Competency: Demonstrate knowledge of technology issues						
Competency Builders:						
	Demonstrate knowledge of the characteristics of technology					
	Demonstrate knowledge of how technology systems are applied					
	Assess the impact of technology on the individual, society, and environment					
	Demonstrate knowledge of the evolution of technology					
	Identify how people, information, tools and machines, energy, capital, physical space, and time influence the selection and use of technology					
	Identify legal and ethical issues related to technology (e.g., confidentiality, information sharing, copyright protection)					
Competency: Demonstrate skills related to technology issues						
Competency Builders:						
	Exhibit willingness to adapt to technological change					
	Utilize technological systems					
	Utilize a variety of resources and processes to solve technological problems					
	Employ higher-order thinking skills for solving technological problems					
	Work as a team member in solving technological problems					
	Use technology in a safe and responsible manner					
	Apply science, mathematics, communication, and social studies concepts to solve technological problems					
	Demonstrate ingenuity and creativity in the use of technology					
	Utilize a formal method (systems approach) in solving technological problem*					

Lifelong Learning						
Competency: Apply lifelong learning practices to individual situations						
Competency Builders:						
	Define lifelong learning					
	Identify factors that cause the need for lifelong learning					
	Identify changes that may require the retraining and upgrading of employee's skills					
	Identify avenues for lifelong learning					
	Participate in lifelong learning activities					
Competency: Adapt to change						
Competency Builders:						
	Analyze the causes and effects of change					
	Identify the effect of change on goals					
	Identify the importance of flexibility when reevaluating goals					
	Evaluate the need for lifelong learning experiences in adapting to change					
Economic Education						
Competency: Analyze how an economy functions as a whole						
Competency Builders:						
	Describe how individuals and societies make choices to satisfy needs and wants with limited resources					
	Identify how production factors (land, labor, capital, and entrepreneurship) are used to produce goods and services					
	Illustrate how individuals and households exchange their resources for the income they use to buy goods and services					
	Explain how individuals and business firms use resources to produce goods and services to generate income					
	Identify characteristics of command, market, and traditional economies*					
	Describe how all levels of government assess taxes in order to provide services					
Competency: Analyze how an economic system is a framework within which decisions are made by individuals and groups						
Competency Builders:						
	List several individuals and groups that make economic decisions at the local, state, and national levels					
	Identify the important roles that local, state, and national governments play in a market economy					
	List examples how government decisions affect individuals					
	Identify how geographic locations affect the political and economic systems of the world					
	Evaluate how markets allocate goods and services					
	Explain how resources, goods, and services are					

	exchanged in markets					
	Explain competition and its effect on the market					
Competency: Analyze the importance of making informed personal financial decisions						
Competency Builders:						
	Describe the need for personal management records					
	Create a personal budget					
	Create a budget for a family of four for one month					
	Explain how credit affects personal/family finances					
	Identify steps to avoid credit problems					
	Make informed consumer choices in response to personal needs and wants					
	Identify factors that influence consumer decisions (e.g., advertisements, peer groups, price, and location)					
	Explain the costs and benefits for individuals of various types of taxation at the local, state, and federal levels					
Balancing Work and Family						
Competency: Analyze the effects of family on work						
Competency Builders:						
	Recognize how family values, goals, and priorities are reflected in the workplace					
	Identify present and future family structures and responsibilities					
	Describe personal and family roles					
	Analyze concerns of working parent(s)					
	Examine how family responsibilities can conflict with work					
	Identify ways to resolve family-related conflicts					
	Explain how to use support systems/community resources to help resolve family-related conflicts					
Competency: Analyze the effects of work on family						
Competency Builders:						
	Identify responsibilities associated with paid and nonpaid work					
	Compare the advantages and disadvantages of multiple incomes					
	Explain how work can conflict with family responsibilities					
	Explain how work-related stress can affect families					
	Identify family support systems and resources					
Citizenship in the Workplace						
Competency: Exercise the rights and responsibilities of citizenship in the workplace						
Competency Builders:						
	Identify the basic rights and responsibilities of citizenship in the workplace					
	Identify situations in which compromise is necessary					
	Examine how individuals from various backgrounds					

	contribute to the workplace					
	Demonstrate initiative to facilitate cooperation					
	Give/receive constructive criticism to enhance cooperation					
Competency: Prepare to work in a multicultural society						
Competency Builders:						
	Identify ways to live in a multicultural society with mutual respect and appreciation for others					
	Examine how culture and experience create differences in people					
	Demonstrate respect for the contributions made by all people					
	Investigate personal cultural background as a means of developing self-respect					
	Make personal choices that reduce discrimination, isolation, and prejudice					
	Work effectively with people irrespective of their race, gender, religion, ethnicity, disability, age, or cultural background					
Leadership						
Competency: Evaluate leadership styles appropriate for the workplace						
Competency Builders:						
	Identify characteristics of effective leaders					
	Compare leadership styles					
	Demonstrate effective delegation skills					
	Investigate empowerment concepts					
	Identify opportunities to lead in the workplace					
Competency: Demonstrate effective teamwork skills						
Competency Builders:						
	Identify the characteristics of a valuable team member					
	Identify methods of involving each team member					
	Contribute to team efficiency and success					
	Determine ways to motivate team members					
Competency: Utilize effective communication skills						
Competency Builders:						
	Identify the importance of listening					
	Demonstrate effective listening skills					
	Demonstrate assertive communication techniques					
	Recognize the importance of verbal and nonverbal cues and messages					
	Prepare written material					
	Analyze written material					
	Give/receive feedback					
	Communicate thoughts					
	Use appropriate language					
	Follow oral and written instructions					
	Demonstrate effective telephone techniques					

	Identify technology in communications					
Entrepreneurship						
Competency: Evaluate the role of small business						
Competency Builders:						
	Identify the impact of small business on the local economy					
	Examine the relationship of small business to a national (USA) and global economy					
	Identify factors that contribute to the success of small business					
	Identify factors that contribute to the failure of small business					
	Identify the components of a business plan					
Competency: Examine entrepreneurship as a personal career option						
Competency Builders:						
	Evaluate personal interests and skills					
	Compare personal interests and skills with those necessary the entrepreneurship					
	Determine motives for becoming an entrepreneur					
	Identify the advantages and disadvantages of owning a small business					
	Compare business ownership to work for others					

Columbus State Community College **Spring 1997**

Engineering Technologies Core Model

College Pathway: Mechanical Engineering Technology

April 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
ENGL 101 Beginning Composition	3	MATH 112 Technical Mathematics II	4	ENGL 102 Essay & Research	3	ENGL 204 Technical Writing	3	HUM 1xx (select from Humanities options)	5	SSCI 10x (select from Social & Behavior Sciences options)	5
MATH 111 Technical Mathematics I	4	PHYS 181 Physics (Mechanics)	4	COMM 105 Speech	3	MECH 241 Mechanical Drafting II	3	MECH 250 Materials Science	3	MECH 260 Basic Mechanisms	4
~~MECH 110 Introduction to Manufacturing~~	3	~~EET 101 Basic Electricity~~	3	MATH 113 Technical Mathematics III	4	MECH 240 Machine Tools	4	MECH 252 Computer Programming for Technicians	3	MECH 261 Tool Machine Design	4
~~MECH 111 Manufacturing Processes~~	4	~~MECH 120 Mechanical Drafting I~~	3	EET 102 Electronic/ Digital Fundamentals	3	~~MECH 251 Computer-Aided Drafting I~~	3	MECH 253 Numerical Control	3	MECH 262 Computer-Aided Drafting II	3
MECH 112 Computer Applications in Manufacturing	3	~~QUAL 240 Total Quality Management~~	3	~~MECH 131 Hydraulics~~	3	MECH 242 Strength of Materials	3	MECH 244 Statistical Process Control	3	MECH 263 Computer-Aided Manufacturing	4
		EMEC 250 Motors and Controls	3	MECH 130 Statics	3	~~MECH 243 Robotics~~	3	EMEC 251 Electro-mechanical Controls I	4	MECH 2XX Advanced Computer-Aided Drafting	4
										EMEC 260 Electro-mechanical Controls II	4

Struck-out courses = those that students may articulate or pass via proficiency testing.
Shaded co[illegible]es = advanced skills added to the curriculum.

Columbus State Community College **Spring 1997** **Engineering Technologies Core Model**

College Pathway: Electromechanical Engineering Technology

April 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
ENGL 101 Beginning Composition	3	MATH 112 Technical Mathematics II	4	ENGL 102 Essay & Research	3	COMM 105 Speech	3	HUM 1xx (select from Humanities options)	5	SSCI 10x (select from Social & Behavior Sciences options)	5
MATH 111 Technical Mathematics I	4	PHYS 181 Physics (Mechanics)	4	EET 130 Electronic Devices	4	PHYS 183 Technical Physics	4	ENGL 204 Technical Writing	3	MECH 240 Machine Tools	4
EET 111 DC Fundamentals	4	EET 120 AC Fundamentals	4	EET 132 Digital Fundamentals	3	EET 243 Digital Devices	4	EMEC 251 Electro--mechanical Controls I	4	EMEC 260 Electro-mechanical Controls II	4
EET 112 DC Laboratory	2	EET 121 AC Laboratory	2	EET 131 Electronics Laboratory	2	EET 244 Digital Devices Laboratory	2	MATH 135 Elementary Statistics	5	MECH 260 Basic Mechanics	4
~~MECH 110 Introduction to Manufacturing~~	3	QUAL 120 Engineering Drawing Interpretation	3	~~MECH 120 Mechanical Drafting I~~	3	~~MECH 243 Robotics~~	3	MECH 244 Statistical Process Control	3	MECH 262 Computer-Aided Drafting II	3
EET 144 PC Hardware	3	~~QUAL 240 Total Quality Management~~	3	~~MECH 131 Hydraulics~~	3	EMEC 250 Motors and Controls	3	MECH 253 Numerical Control	3		

Struck-out courses = those that students may articulate or pass via proficiency testing.
Shaded courses = advanced skills added to the curriculum.

OHIO UNIVERSITY-LANCASTER **1997-98** **MANUFACTURING INDUSTRIAL**
HEART OF OHIO TECH PREP CONSORTIUM **TECHNOLOGY (A.A.S.)**

Freshman Year Sequence

Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
IT 101 - Engineering Drawing I	3	IT 102 - Engineering Drawing II	3	IT 110 - Intro to Manufacturing Process	4
MATH 117 - Elementary Applied Mathematics	4	MATH 118 - Elementary Applied Mathematics	4	MATH 163A - Intro to Calculus	4
CHEM 121 - Principles of Chemistry	4	CHEM 122 - Principles of Chemistry	4	IT 260 - Line Supervision	3
ENG 151 - Freshman Composition	5	PSY 101 - General Psychology	5	BA 101 - Business Environment	4
				INCO 103 - Fundamentals of Public Speaking	4
TOTAL Credit Hours	16		16		19

Sophomore Year Sequence

Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
PHYS 201 - Physics: Mechanics	4	PHYS 202 - Physics: Electricity/Heat/Light	4	MTCH 290 - Materials	3
MTCH 261 - Manufacturing I	3	MTCH 262 - Manufacturing II	3	MTCH 221 - Basic Pneumatics	3
DTCH 230 - Tool Design	4	MTCH 220 - Basic Hydraulics	3	MTCH 263 - Manufacturing III	3
IT 115 - Metal Fabrication	3	ETCH 110 - Basic Electronics	5	MTCH 264 - Manufacturing IV	3
Elective	4			MTCH 299 - Special Problems	3
TOTAL Credit Hours	18		15		15

Westerville Schools
Westerville South High School

1997

Engineering Core/
Mechanical/Manufacturing
Engineering Technology

Heart of Ohio Tech Prep Consortium

9th Grade	Min.	10th Grade	Min.	11th Grade	Min	12th Grade	Min
TP Career Focus TP High Tech Career Systems/ Keyboarding	50 50	Exploratory Computer Applications TP High Tech Career Systems II	50 50	TP Engineering Core Mechanical/ Manufacturing Algebra II/Geometry	150	Social Studies Algebra III/FST/College Prep Applied Language Arts/English 12	50 50 50
English 9	50	English 10	50	TP Mentorship	50	TP Engineering Core Mechanical/ Manufacturing Physics	150
Phy. Ed./Social Studies	50	Social Studies/Fine Arts	50	English 11	50		
Algebra 1/Integrated 1	50	Geometry/Integrated II	50	Social Studies	50		
Science	50	Elective	50	Chemistry	50		

Prerequisites for Grade 11 of Tech Prep: Passage of all parts of 9th grade proficiency test, Algebra I.

Prerequisites for college port of Tech Prep: Articulation or proficiency testing will determine where students place into the program.

Suggested Electives: Photography (fine arts).

Explanation of Tech Prep Blocks: Students will be enrolled in a 150 min. Tech Prep block that will include one academic (science). Grade 11 integrates occupational, employability skills with Geometry. Grade 12 integrates occupational, employability skills with Physics. Other college prep academics will be taught outside the block. Students should complete Algebra II or equilivant.

High School Exit Occupations: Assembly technician, beginning drafter, CAD operator, production expediting clerk, machine operator, precision assembler, maintenance repairer, electrical/electronic, assembler, drafting technician, entry level machinist, and materials handler.

College Exit Occupations: (Based on AAS in Electronic, Mechanical or Electro-Mechanical Engineering Technology) mechanical engineering technician, CAD operator, material technologist, robotics technician, drafter-designer maintenance technician or supervisor, machine programmer, machine shop supervisor, industrial engineering technician, electronics service technician, test technician, machine designer, quality machine designer, quality controller, industrial supervisor, production scheduler, and production engineer technician.

Mechanical CAD Drafting

MECH 251 and MECH 131

LEVEL		**11**	**12**	**AD**	**WS**	**LL**
Competency: Create 2-D orthographic drawings						
Competency Builders:						
	Create primitive drawing entities					
	Draw utilizing absolute Cartesian coordinates					
	Draw utilizing relative Cartesian coordinates					
	Draw utilizing polar coordinates					
	Draw using construction aides (e.g., snaps, grid, snap, etc.)					
	Change drawing attributes					
	Edit drawing entity properties (e.g., color, layer, thickness, linetype)					
	Construct drawing entities (e.g., offset, timer, extend, break, mirror, etc.)					
	Edit drawing entities (e.g., offset, timer, extend, break, mirror, etc.)					
	Set system variables (e.g., units, scale)					
	Use system variables					
	Create layers					
	Name layers					
	Manipulate layers					
	Save files					
	Create back-ups					
	Create hatches, patterns, symbols					
	Recall drawing templates/block					
Competency: Annotate orthographic drawings						
Competency Builders:						
	Create text styles					
	Edit text styles					
	Select text styles					
	Apply notes					
Competency: Dimension orthographic drawings						
Competency Builders:						
	Create dimensions					
	Edit text					
	Control dimension variables/models					

Competency: Control display						
Competency Builders:						
	Apply view control while drawing (e.g., zoom and pan)					
	Control view resolution (e.g., viewers)					
	Save views					
	Display views					
Competency: Extract entity and drawing information						
Competency Builders:						
	Measure distances					
	Measure areas					
	Identify locations					
	List entity characteristics (e.g., length, size, location, properties, etc.)					
Competency: Manage symbols and attributes						
Competency Builders:						
	Create blocks and W-blocks/templates					
	Create nested blocks/templates					
	Insert blocks and drawings/templates					
	Redefine blocks/templates					
	Edit blocks/templates					
	Apply attributes					
Competency: Create 2-D isometric drawings						
Competency Builders:						
	Manipulate snap and grid settings					
	Toggle planes (e.g., left, right, top)					
	Create text styles for each plane					
	Create dimension styles					
	Use dimension styles					
	Create isometric ellipses					
Competency: Create script files						
Competency Builders:						
	Write a slide show script					
	Write a script for setting initial variable settings					
	Write a script for creating a title-block					

Competency: Create custom linetypes						
Competency Builders:						
	Formulate a linetype composed of long dashes					
	Formulate a linetype composed of lines, dashes and dots					
Competency: Apply advanced control display techniques						
Competency Builders:						
	Define camera viewpoints and angle of rotation					
	Control display angle (e.g., d-view, v-point)					
Competency: Apply intermediate drafting skills						
Competency Builders:						
	Prepare sectional views					
	Prepare auxiliary views					
	Identify ANSI symbols					
	Prepare views of drilled and tapped holes, counterbores, countersinks					
	Identify a bill of materials					
	Dimension drawings using ANISy14.5 standards					
	Describe purpose of auxiliary and sectional views					
	Interpret reports and specifications					
	Prepare pictorial drawings					
	Prepare schematics					
	Interpret basic pneumatic/hydraulic standard and symbols					
Competency: Interpret basic prints						
Competency Builders:						
	Visualize object from drawing					
	Interpret orthographic projections					
	Interpret sectional views					
	Interpret detail and assembly drawings					
	Interpret dimensions					
	Interpret tolerances					

Competency: Interpret intermediate prints						
Competency Builders:						
	Interpret screw thread specifications					
	Interpret electrical, pneumatic/hydraulic drawings					
	Interpret schematics					
Competency: Demonstrate knowledge of basic geometric dimensioning and tolerancing						
Competency Builders:						
	Identify geometric characteristics and symbols (i.e., flatness, straightness, roundness, cylindricity, profile of line, profile of surface, perpendicularly, angularity, parallelism, circular, runout, total indicated runout, position, concentricity, and symmetry)					
	Define maximum material condition					
	Define least material condition					
	Define regardless of feature size condition					
	Describe feature control blocks					
	Describe datum surfaces and targets					
	Define flatness (pitch)					
	Define straightness (yaw)					
	Define roundness					
	Define cylindrically					
	Define profile of line					
	Define profile of surface					
	Define perpendicularly					
	Define angularity					
	Define parallelism					
	Define circular runout					
	Define total runout					
	Define true position concept to determine tolerance for location of holes in mating parts					
Competency: Demonstrate dimensioning techniques using CAD						
Competency Builders:						
	Construct arrowheads using various styles/disciplines					
	Apply symbols for surface and texture control					
	Add labels/notes to drawing					
	Interpret decimal tolerance dimensions					

	Dimension arcs					
	Dimension angles					
	Dimension curves					
	Dimension rounded-end shapes					
	Dimension spherical objects					
	Dimension cylindrical objects					
	Dimension cones, pyramids, and prisms					
	Dimension features on circular center line					
	Dimension theoretical pint of intersection					
	Dimension object using rectangular coordinate system					
	Dimension object using polar coordinate system					
	Dimension object using tabular coordinate system					
	Dimension object using ordinate dimensioning system					
Competency: Apply geometric dimensioning and tolerancing using CAD						
Competency Builders:						
	Interpret decimal tolerance dimensions					
	Calculate clearance fit tolerances of mating parts					
	Dimension clearance fit tolerances of mating parts					
	Calculate interference fit tolerances of mating parts					
	Dimension interference fit tolerances of mating parts					
	Calculate tolerances to mating parts using standard fit tables					
	Assign tolerances to mating parts using standard fit tables					
	Apply positional and form tolerancing symbols					
	Apply symbols for true position					
	Apply symbols for maximum material control and regardless of feature size					
	Calculate effects of dimensional stack-up					
	Calculate transitional fit tolerances					
	Dimension transitional fit tolerances					
Competency: Prepare electrical/electronic CAD drawings						
Competency Builders:						
	Interpret basic electric/electronic standards and symbols					
	prepare schematic drawings					
	Prepare component drawings					

	Prepare logic diagrams					
	Prepare printed circuit board drawings					
	Prepare wiring diagrams					
	Prepare symbol library					
Competency: Prepare pneumatic/hydraulic CAD drawings						
Competency Builders:						
	Interpret basic pneumatic/hydraulic standards and symbols					
	Prepare piping drawings					
	Prepare isometric drawings					
	Prepare graphical symbols					
	Prepare pump and motor drawings					
	Prepare cylinder and piston diagrams					
	Prepare symbol library					

Mechanical/Manufacturing Engineering Technology

Robotics MECH 243						
LEVEL		**11**	**12**	**AD**	**WS**	**LL**
Competency: Identify and describe various types of robots and their working parts						
Competency Builders:						
	Describe a three axis robot					
	Describe a four axis robot					
	Describe a five axis robot					
Competency: Demonstrate robotic control systems						
Competency Builders:						
	Demonstrate use of DC motors in robot control systems					
	Demonstrate use of AC motors in robot control systems					
	Demonstrate use of stepper motors in control systems					
	Demonstrate use of hydraulic in robot controlled systems					
	Demonstrate use of pneumatic in robot controlled systems					
Competency: Describe various sensors and their use						
Competency Builders:						
	Describe the operation and use of infrared sensors					
	Describe the operation and use of video sensors					
	Describe the operation and use of tactile sensors					
	Describe the operation and use of limit switches					
	Describe the operation and use of proximity					
Competency: Describe control methods used to control the various types of robots						
Competency Builders:						
	Describe open loop control systems					
	Describe closed loop control systems					
Competency: Interface robots and computers						
Competency Builders:						
	Demonstrate computer control of DC motors					
	Demonstrate computer control of AC motors					
	Demonstrate computer control of stepper motors					
	Demonstrate computer control of hydraulics					
	Demonstrate computer control of pneumatics					

Competency: Select an appropriate robot to perform a specific job or operation						
Competency Builders:						
	Analyze task requirements for required motion and velocity					
	Determine number of axis movements required					
	Determine required precision					

Hydraulics & Pneumatics

LEVEL		11	12	AD	WS	LL
Competency: Solve basic hydraulic problems						
Competency Builders:						
	Solve problems involving Pascal					
	Calculate hydraulic horsepower					
	Calculate size of cylinders					
	Calculate size of hydraulic motors					
	Select size of hose or pipe given flow and pressure requirements					
	Determine system pressure and flow rate given physical requirements					
Competency: Identify standard pipe and hose fittings						
Competency Builders:						
	Identify standard pipe threads					
	Identify straight thread tubing threads					
	Identify welded flanges					
	Identify "O" ring fittings					
Competency: Identify various power train designs						
Competency Builders:						
	Describe uses of gasoline based power trains					
	Describe uses of electric power trains					
	Describe various transmission systems					
	Identify various pump styles and their uses					
Competency: Demonstrate control techniques						
Competency Builders:						
	Demonstrate the function and operation of pressure control valves					
	Demonstrate the function and operation of flow control valves					
	Demonstrate the function and operation of directional control valves					
	Demonstrate the function and operation of cylinders (SA, DA, DR, and telescope)					
	Demonstrate the function and operation of cylinder cushions					

Graphic Communications Engineering Technology

Mechanical CAD Drafting
MECH 251 and MECH 131

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	Dimension cylindrical objects					
	Dimension cones, pyramids, and prisms					
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	Apply positional and form tolerancing symbols					
	Apply symbols for true position					
	Apply symbols for maximum material control and regardless of feature size					
	Calculate effects of dimensional stack-up					
	Calculate transitional fit tolerances					
	Dimension transitional fit tolerances					

Competency: Prepare electrical/electronic CAD drawings						
Competency Builders:						
	Interpret basic electric/electronic standards and symbols					
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	Prepare component drawings					
	Prepare logic diagrams					
	Prepare printed circuit board drawings					
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	Prepare symbol library					
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Competency Builders:						
	Interpret basic pneumatic/hydraulic standards and symbols					
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	Prepare isometric drawings					
	Prepare graphical symbols					
	Prepare pump and motor drawings					
	Prepare cylinder and piston diagrams					
	Prepare symbol library					

Black and White Photography

GRAPH 111

LEVEL		11	12	AD	WS	LL
Competency: Apply photographic techniques						
Competency Builders:						
	Identify and operate parts of a camera					
	Identify and operate parts of an enlarger					
	Expose and enlarge black and white photo paper					
	Demonstrate knowledge of film chemistry					
	Select enlarging papers					
	Select and use contrast filters					
	Burn and dodge prints					
	Create photograms					
	Produce proof sheets					
	Operate on camera flash					
	Operate an off camera flash					
	Demonstrate use of various light meters					
	Control shutter speed					
	Control aperture					
	Control file speed					
	Control lighting					
	Utilize special effect filters					
Competency: Prepare photos for display						
Competency Builders:						
	Dry mount prints					
	Spot tone prints					
	Hand tint prints					
	Sepia tone prints					
Competency: Apply composition techniques						
Competency Builders:						
	Apply rule of thirds					
	Apply leading lines					
	Apply repeated shapes or patterns					
	Apply selective focus					
	Apply depth of field					
	Apply panning					
	Apply framing					

Competency: Describe the history of photography						
Competency Builders:						
	Identify the works by master photographers i.e., Ansel Adams, Alfred Stieglitz, Minor White, Margaret Bourke-White, Edward Weston, etc.					
	Identify major advancements in the evolution of photography					

Graphic Communications Engineering Technology

Introduction to Computer Graphics

GRAPH 112

LEVEL		11	12	AD	WS	LL
Competency: Operate Macintosh desktop and find applications						
Competency Builders:						
	Load a floppy disk on CD					
	Name a floppy disk					
	Use the finder menu options					
	Move an identified item					
Competency: Operate both mouse and keyboard equivalent commands						
Competency Builders:						
	Point, click and drag mouse for selecting and highlighting					
	Launch applications to open a document					
	Use key stroke commands to execute computer commands					
	Resize, move, zoom, scroll, save, and close document windows					
Competency: Manipulate files						
Competency Builders:						
	Create files					
	Edit files					
	Store files					
	Retrieve files					
Competency: Manipulate standard Macintosh menu commands						
Competency Builders:						
	Select an application from the applications icon					
	Launch an application from the file icon and document icon					
	Open multiple document windows					
	Use menu bar commands, such as file, edit, view, insert, format, tools, window, and help					

Competency: Demonstrate basic working knowledge in software applications						
Competency Builders:						
	Perform spreedsheet functions					
	Apply word processing functions					
	Perform computer business graphics					
	Perform database functions					
	Use a drawing program					
	Use a paint program					
	Operate a electronic publishing program					
	Apply telecommunications functions					
Competency: Manipulate laser printer output						
Competency Builders:						
	Load print driver software					
	Load paper and printer cartridges					
	Print a document					
Competency: Demonstrate a minimum standard of keyboard proficiency						
Competency Builders:						
	Keyboard at 30 wpm using the touch method					
	Use a self-paced keyboarding training software					
Competency: Use an industry-application of computer graphics						
Competency Builders:						
	Produce graphs, tables, and charts to communicate ideas					
	Construct and design layouts					
	Prepare layout of a document according to lab procedures					

Graphic Communications Engineering Technologies

Electronic Publishing
GRPH 122 (Macintosh based-course)

LEVEL		**11**	**12**	**AD**	**WS**	**LL**
Competency: Demonstrate proper launching of the QuarkXPress software application						
Competency Builders:						
	Open the software application from the original folder					
	Open the application from the startup folder					
	Open the application from the desktop					
	Open the application from the apple menu					
Competency: Create new QuarkXPress documents						
Competency Builders:						
	Create text items					
	Create drawings and pictures					
	Create line elements					
	Group elements					
Competency: Import elements into a QuarkXPress document						
Competency Builders:						
	Import text into the document					
	Import graphic images into the document					
Competency: Manipulate text materials for use in high-quality typographic documents						
Competency Builders:						
	Use QuarkXPress capabilities to create text material					
	Use QuarkXPress capabilities to edit text material					
	Use QuarkXPress capabilities to manipulate text material on a page layout in terms of size, location, rotation, grouping, etc.					
	Use QuarkXPress capabilities to ensure high-quality reproduction of text material					
Competency: Manipulate picture and graphic material						
Competency Builders:						
	Use tools in a tool/box to size a picture and graphic					
	Use tools in a tool/box to rotate a picture and graphic					
	Use tools in a tool/box to stretch a picture and graphic					
	Use tools in a tool/box to alter contrast a picture and graphic					
	Use tools in a tool/box to color a picture and graphic					

Competency: Manipulate document and background (master) page elements						
Competency Builders:						
	Set up document page elements					
	Set up background page elements					
	Change master page elements					
Competency: Demonstrate use of floating palettes and menu options						
Competency Builders:						
	Use draw tools					
	Add, format, edit, change, move, copy, and import text					
	Add, format, edit, change, move, copy, and import tables					
	Add, change, move, copy, import, and delete pictures					
	Add, change, rotate, flip wordart					
	Use borders					
	Fill and shape frames					
	Apply links with other applications					
Competency: Perform save, open, and print operations						
Competency Builders:						
	Save information with a document					
	Save the entire document					
	Open information within a document					
	Print information from within a document					
	Print the entire document					

Computer Graphic Illustration

GRPH 243 (Macintosh based)

LEVEL		11	12	AD	WS	LL
Competency: Demonstrate an understanding of the impact of computer graphic illustration technology						
Competency Builders:						
	Describe the debut of computer graphic illustration (historical perspective) on Macintosh computers					
	Define artistic freedom					
	Describe the impact of computer graphic illustration on artistic freedom					
	Discuss the "power" of the personal computer as it affects individual users, the graphic communications industry, and society in general					
Competency: Demonstrate use of terms, tools, and menus of Adobe Illustrator (TM) software						
Competency Builders:						
	Identify the basic operations and operating terms for use of graphic illustration software					
	Identify basic typographic conventions					
	Identify the available tool slots in the Adobe Illustrator toolbox					
	Demonstrate basic uses of tools in the toolbox					
	Identify basic menus and commands, including outline apple, file, edit, arrange, view, paint, type, window, and graph menus					
	Demonstrate basic uses of menus and commands					
	Perform shortcuts using dialog boxes					
Competency: Perform basic procedures for creating and saving graphic illustrations						
Competency Builders:						
	Create an illustration using tracing templates					
	Open an existing file inside Adobe Illustrator					
	Create a two-page layout in the illustration window					
	Demonstrate how to set references by changing preference settings					
	Demonstrate drawing with objects by determining a path					
	Save an illustration by replacing an existing file					
	Finish an illustration by closing the file					

Competency: Demonstrate original (no template) drawing paths						
Competency Builders:						
	Draw a rectangle and ellipse and create a geometric path at an angle					
	Extend a line by applying the freehand tool					
	Demonstrate Bexjier paths by drawing straight segments, perpendicular segments and cumed, and create a cusp					
Competency: Trace bitmapped images						
Competency Builders:						
	Perform automated tracing by tracing a portion of an image					
	Demonstrate Adobe Streamline features by converting a bitmapped image and editing a converted illustration					
Competency: Reshape existing paths						
Competency Builders:						
	Select all elements					
	Deselect individual elements					
	Reshape geometric paths					
	Demonstrate moving of elements by dragging a segment and measuring a move					
	Add and delete elements and convert points					
	Join endpoints and split elements					
	Demonstrate averaging of points by averaging along a rotated axis					
Competency: Demonstrate preparation of type						
Competency Builders:						
	Create text objects, including point, area, and path text					
	Import text into columns					
	Demonstrate adjustment of area text by deleting and unlinking a text block					
	Format text by selecting and editing text					
	Perform text wrap around graphics by adjusting standoff and unwrapping text blocks					
Competency: Perform fills of graphic objects						
Competency Builders:						
	Explain how fill affects a graphic object					
	Color (paint) a fill					
	Create a title pattern					
	Create clipping paths and multiple masks					
	Create compound paths and texts (make holes)					
	Discuss filling theory					
	Demonstrate filling					
Competency: Demonstrate transforming and duplication of graphic objects						

Competency Builders:						
	Distinguish groups from nongroups					
	Control movement of graphic objects by creating, manipulating, and converting guides to objects					
	Protect objects by locking, unlocking, hiding, and showing objects					
	Demonstrate scaling an object by scaling a clone using the scale-dialog tool					
	Flip objects using the relevant tools					
	Demonstrate object rotation by using rotate-dialog and shear-dialog tools					
	Demonstrate object transformation by transforming rotated objects					
	Demonstrate object duplication by duplicating a transformation					
	Demonstrate layering of objects by layering combined objects					
	Demonstrate blending of objects by blending multiple paths					
Competency: Perform creation and manipulation of graphics						
Competency Builders:						
	Create a graph by applying data to bar, pie, and area charts					
	Edit a graph to customize it					
	Apply graph designs to a bar and line chart					
	Import graphics by placing EPS (Encapsulated Postscript) graphics and opening the illustration					
	Export an illustration by saving the illustration in EPS format					
	Convert drawing into illustrations by applying the drawover utility					
Competency: Operate peripheral graphic and text devices						
Competency Builders:						
	Operate a graphic tablet					
	Use a video camera to create graphic files					
	Use a scanner to create graphic files					
Competency: Print illustrations						
Competency Builders:						
	Choose a printer					
	Set up a page to print					
	Adjust page sizes for printing					
	Create crop marks for printing oversized documents					
	Print oversized documents					

Columbus State Community College **Spring 1997** **Engineering Technologies Core Model**

College Pathway: Architecture Technology-Landscape Focus

March 25, 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
ENGL 101 Beginning Composition	3	ENGL 102 Essay & Research	3	BMGT 111 Management	5	CIVL 232 Statics & Strength of Materials	3	HUM XXX Humanities	5	SSCI 1XX Social Science	5
MATH 104 Intermediate Algebra	5	MATH 148 College Algebra	5	COMM 1XX Speech or Conf & Group Disc.	3	ARCH 212 Mechanical Systems (HAC)	3	ENGL 204 Technical Writing	3	ARCH 216 Mechanical Systems (Plumbing)	3
ARCH 100 Intro. to Architecture	4	LAND 102 Landscape Design I	3	ARCH 155 Structural Systems (Wood)	3	ARCH 232 Building Construction Standards	3	ARCH 214 Mechanical Systems (Electrical)	3	ARCH 264 Working Drawings II	5
~~ARCH 111 Basic Const. Drafting~~	~~3~~	ARCH 161 Architectural Drafting	4	LAND 152 Site Planning	4	LAND 202 Landscape Design II	3	ARCH 263 Working Drawings I	4	Technical Elective	3
~~CIVL 120 Basic Const. Materials~~	~~3~~	~~CMGT 121 Building Construction Drawings~~	~~3~~	~~ARCH 112 Const. CAD Drafting~~	~~3~~	ARCH 250 Building Enclosure Materials	3	CIVL 237 Structural CAD Design & Detailing	4		
LAND 101 Landscape Principles	3	ARCH 113 Construction CAD Drafting II	3	LAND 105 Landscape Plants I	4	ARCH 262 Presentations Drawings	4				
CPT 101 Computer Literacy I	3										

Struck-out courses = those that students may articulate or pass via proficiency testing.

Shaded courses = advanced skills added to the curriculum.

Westerville Schools
Westerville South High School

1997

Engineering Core/
Landscape/Design Build
Engineering Technology

Heart of Ohio Tech Prep Consortium

9th Grade	Min.	10th Grade	Min.	11th Grade	Min	12th Grade	Min
TP Career Focus	50	Exploratory Computer Applications	50	TP Engineering Core Landscape/Design Build Algebra II/Geometry	150	Social Studies	50
TP High Tech Career Systems/ Keyboarding	50	TP High Tech Career Systems II	50			Algebra III/FST/College Prep	50
						Applied Language Arts/English 12	50
English 9	50	English 10	50	TP Mentorship	50	TP Engineering Core Landscape/Design Build Physics	150
Phy. Ed./Social Studies	50	Social Studies/Fine Arts	50	English 11	50		
Algebra 1/Integrated 1	50	Geometry/Integrated II	50	Social Studies	50		
Science	50	Elective	50	Chemistry	50		

Prerequisites for Grade 11 of Tech Prep: Passage of all parts of 9th grade proficiency test, Algebra I.

Prerequisites for college part of Tech Prep: Articulation or proficiency testing will determine where students place into the program.

Suggested Electives: Photography (fine arts).

Explanation of Tech Prep Blocks: Students will be enrolled in a 150 min. Tech Prep block that will include one academic (science). Grade 11 integrates occupational, employability skills with Geometry/Algebra II. Grade 12 integrates occupational, employability skills with Physics. Other college prep academics will be taught outside the block.

High School Exit Occupations: Beginning drafter, landscape crew member, CAD operator, drafting technician.

College Exit Occupations: Merchandiser, landscape design contractor. landscape foreman, facilities management technician, wholesale/retail nursery manager, botanic garden manager, arboriculture crew member, irrigation specialist, and estate grounds manager.

Construction CAD Drafting

LEVEL		11	12	AD	WS	LL
Competency: Create 2-D orthographic drawings						
Competency Builders:						
	Create primitive drawing entities					
	Draw utilizing absolute Cartesian coordinates					
	Draw utilizing relative Cartesian coordinates					
	Draw utilizing polar coordinates					
	Draw using construction aides (e.g., snaps, grid, snap, etc.)					
	Change drawing attributes					
	Edit drawing entity properties (e.g., color, layer, thickness, linetype)					
	Construct drawing entities (e.g., offset, timer, extend, break, mirror, etc.)					
	Edit drawing entities (e.g., offset, timer, extend, break, mirror, etc.)					
	Set system variables (e.g., units, scale)					
	Use system variables					
	Create layers					
	Name layers					
	Manipulate layers					
	Save files					
	Create back-ups					
	Create hatches, patterns, symbols					
	Recall drawing templates/block					
Competency: Annotate orthographic drawings						
Competency Builders:						
	Create text styles					
	Edit text styles					
	Select text styles					
	Apply notes					
Competency: Dimension orthographic drawings						
Competency Builders:						
	Create dimensions					
	Edit text					
	Control dimension variables/models					

Competency: Control display						
Competency Builders:						
	Apply view control while drawing (e.g., zoom and pan)					
	Control view resolution (e.g., viewers)					
	Save views					
	Display views					
Competency: Extract entity and drawing information						
Competency Builders:						
	Measure distances					
	Measure areas					
	Identify locations					
	List entity characteristics (e.g., length, size, location, properties, etc.)					
Competency: Manage symbols and attributes						
Competency Builders:						
	Create blocks and W-blocks/templates					
	Create nested blocks/templates					
	Insert blocks and drawings/templates					
	Redefine blocks/templates					
	Edit blocks/templates					
	Apply attributes					
Competency: Create 2-D isometric drawings						
Competency Builders:						
	Manipulate snap and grid settings					
	Toggle planes (e.g., left, right, top)					
	Create text styles for each plane					
	Create dimension styles					
	Use dimension styles					
	Create isometric ellipses					
Competency: Create script files						
Competency Builders:						
	Write a slide show script					
	Write a script for setting initial variable settings					
	Write a script for creating a title-block					

Competency: Create custom linetypes						
Competency Builders:						
	Formulate a linetype composed of long dashes					
	Formulate a linetype composed of lines, dashes and dots					
Competency: Apply advanced control display techniques						
Competency Builders:						
	Define camera viewpoints and angle of rotation					
	Control display angle (e.g., d-view, v-point)					
Competency: Create a set of architectural working drawings (plan set) for a small office building						
Competency Builders:						
	Produce an architectural floor plan					
	Use the appropriate symbols, linework and poche to indicate walls, doors, windows, hidden overhead elements, and materials of construction					
	Develop exterior building elevations fro floor plans and section cuts					
	Use simple material symbols to indicate exterior materials of construction					
	Use a simple building section (outline) to develop exterior elevations					
	Use the pilot command to plot the site drawing and architectural plan/elevation sheet					
Competency: Describe the function of and use of block command to create a library of commonly used elements						
Competency Builders:						
	Describe and use the block commands to create an architectural library of elements in building construction; i.e., windows, doors, plumbing fixtures and furniture. Correctly place the blocks in the architectural floor plan of a small office building.					
	Create a site plan using surveying units. Use the block commands to create library of site elements. Using the floor plan, create and insert the roof plan of the small office building as a block into the site plan.					

Competency: Use the appropriate scale, measurement systems and symbols to develop site plans						
Competency Builders:						
	Include cadastral (legal property information)					
	Include site plan information					
	Include topographic (physical objects) information					
Competency: Use electrical symbols, plumbing symbols, and HVAC symbols to develop electrical, plumbing, and mechanical drawings on individual layers in a CAD system						
Competency Builders:						
	Add electrical symbols to a floor plan					
	Add HVAC symbols to a floor plan					
	Add plumbing symbols to a floor plan					

Landscape Design Build

Basic Construction Materials

CIVL 120 (Formerly ARCH 120)

LEVEL		11	12	AD	WS	LL
Competency: Perform basic area, volumetric, strength and density calculation						
Competency Builders:						
	Perform mass, volume, specific weight and specific gravity calculations					
	Perform force, area, stress and strength calculations					
Competency: Use industry standard references and specifications to determine material acceptability						
Competency Builders:						
	Describe quality control and quality assurance in by conformance to industry codes, specifications, standards and formats					
	Differentiate amongst industry codes, specifications, standards and formats and cite applicable examples					
	Compare industry manufacturer's data to standard references and specifications to determine material acceptability					
Competency: Perform basic soils analyses						
Competency Builders:						
	Describe soil particles by grain size in accordance with American Association of State Highway Transportation Officials (AASHTO) standards					
	Determine the moisture content of a soil sample in accordance with American Society of Testing Materials, ASTM D-2216 or ASTM D-4643					
	Determine Soil Particle Size by Sieve Analysis in accordance with ASTM D-442					
	Describe the procedure for performing soil compaction test by Proctor Method in accordance with ASTM D-698 and ASTM D-1557					
	Differentiate between the procedures for Standard and Modified Proctor Tests					
Competency: Describe the manufacture and list the basic test applicable to bituminous (flexible) pavement						
Competency Builders:						
	Describe the process in the manufacture and placement of bituminous (flexible) pavement					

	List the tests and inspection procedures in the manufacture and placement of bituminous (flexible) pavement					
	Describe the structure (base, intermediate and wearing coarses) of various types of bituminous (flexible) pavement systems including applications					
Competency: Perform basic Portland Cement Concrete tests						
Competency Builders:						
	Properly prepare, weigh and mix the ingredients for Portland Cement Concrete					
	Describe the proper procedure for sampling freshly-mixed concrete in accordance with ASTM C-172					
	Obtain temperature of freshly-mixed Portland Cement Concrete in accordance with ASTM C-1064					
	Perform the Slump Test of Portland Cement Concrete in accordance with ASTM C-143					
	Describe the proper procedure for determining the Air Content of freshly-mixed Portland Cement concrete by Pressure Method in accordance with ASTM C-231					
	Perform the correct procedure for Casting and Curing Portland Cement Concrete Test Specimens in the Field in accordance with ASTM C-31					
	Perform the correct procedure for determining the Compressive Strength of Cylindrical Concrete Specimens in accordance with ASTM C-39					
	List three (3) methods, including corresponding ASTM specification number of testing the strength of "in place" concrete					
Competency: Describe the manufacture, perform basic testing and build simple structures of masonry products						
Competency Builders:						
	Describe the major operations in the manufacture of brick					
	Describe the major operations in the manufacture of concrete masonry units (CMU's)					
	Properly prepare, weigh and mix the ingredients for Portland Cement Mortar in accordance with ASTM C-150					
	Construct a small masonry wall					
	Describe the correct procedure for testing Concrete Masonry Units in accordance with ASTM C-140 for conformance with ASTM C-90					
	Describe the correct procedure for Sampling and Testing Brick and Structural Clay Tile in accordance with ASTM C-67 and ASTM C-216					

Competency: List the materials, describe the properties, applications and testing of metals in Division 0500 for the Construction Specification Institute format						
Competency Builders:						
	List the metals, each metal's application and resistance to corrosion					
	Describe the typical metals test for strength					
	Identify the critical points, corresponding stress and strain and the ranges on a stress/strain curve					
	Given the characteristic shapes of specific stress/strain curves; identify the specific metal					
	Given American Institute of Steel Construction (AISC) standards designations for rolled sections, identify the specific shape, by picture/graphic, and where applicable list the sections' name and weight per lineal foot					
	List the major methods of joining steel sections					
	By ASTM designation, list the various alloys of structural steel and corresponding properties					
	Differentiate between the chemical composition and associated properties of cast iron and steel					
Competency: List the general classifications and grades and applications, describe defects, perform basic strength tests and construct a simple structure of word products						
Competency Builders:						
	Differentiate between softwoods and hardwoods					
	Describe the possible defects in wood					
	In accordance with US Department of Commerce Product Standard PS 20, list the various grade of softwoods and give specific examples					
	Rough frame a wall having at least one (1) opening or penetration					
	List the various types of manufactured wood (i.e., plywood, oriented strand board, etc.) in accordance with American Plywood Association (APA) Standards and cite examples					
	In accordance with American Plywood Association (APA) Standards, describe the grades and ratings applicable to manufactured wood systems					

Landscape/Design Build

Landscape Space Principles

LAND 101

LEVEL		**11**	**12**	**AD**	**WS**	**LL**
Competency: Demonstrate knowledge of composition						
Competency Builders:						
	Describe and demonstrate balance as it applies to composition					
	Describe and use texture as it applies to composition					
	Describe and use color as it applies to composition					
	Describe and demonstrate form as it applies to composition					
	Describe and demonstrate scale as it applies to composition					
	Properly identify harmonious examples as they relate to composition					
	Explain and identify rhythm as it applies to composition					
	Explain and demonstrate unity as it applies to composition					
Competency: Demonstrate knowledge of landscape elements						
Competency Builders:						
	Describe and demonstrate plant material as it functions as a landscape element					
	Identify the impact of buildings as they relate to landscape elements					
	Describe landscape accents as they relate to use as landscape elements					
	Identify and describe land form as an element in the design process					
	Identify and describe hardscapes as an element in the design process					
Competency: Plan landscape design programs (processes)						
Competency Builders:						
	Perform a client interview as a step of the design process					
	Perform a site inventory as a step of the design process					
	Perform a site analysis as a step of the design process					
	Draw and explain a schematic diagram as a step of the design process					
	Prepare a preliminary master plan as a step of the design process					
	Prepare and present a master plan of the landscape					

Landscape Design LAND 102						
Competency: Demonstrate knowledge of plant science						
Competency Builders:						
	List the physical components of plant material					
	Describe and explain basic plant processes as they relate to plant growth					
	Identify the vascular system as it relates to plant growth					
	Identify and describe the environmental impacts on the plant growth process					
	Differentiate between woody and herbaceous plants					
	Differentiate between evergreen and deciduous plants					
	Identify basic plant parts and their functions					
	Explain the photosynthesis process and its function					
	Identify the functions of roots, stems, and leaves					
	Identify the requirements for healthy plant growth					
	Compare taproot and fibrous root systems					
	Identify techniques for conserving water					
Competency: Test soil, water, and plant tissues						
Competency Builders:						
	Follow general safety precautions related to the testing of soil, water, and plant tissues					
	Take soil samples for testing					
	Take water samples for testing					
	Collect plant tissues for testing					
	Interpret soil test results received					
	Interpret water test results received					
	Interpret plan tissue test results received					
	Determine pH levels					
	Determine soluble salt levels					
Competency: Prepare media mixes						
Competency Builders:						
	Follow general safety precautions related to the use of media materials					
	Identify media functions					
	Shred/mix planting media materials					
	Identify types of media pasteurization					
	Select premixed media for purchase					

Competency: Prepare soil mixes						
Competency Builders:						
	Demonstrate the processes of amending soil					
	Describe the impact of amendments on soil structure or texture					
	Describe and explain the properties of different soil amendments					
Competency: Demonstrate knowledge of soil sciences						
Competency Builders:						
	Identify and determine the feature of soil					
	Identify and determine the structure of soil					
	Explain and measure soil moisture					
	Measure and describe soil pH					
	Measure and describe soil nutrient content					
Competency: Plan landscape designs						
Competency Builders:						
	Explain the reasons for landscaping					
	Identify the general objectives for developing a landscape plan					
	Identify the characteristics of the three basic areas of a home landscape					
	Analyze site conditions					
	Interpret soil survey maps					
	Consider environmental conditions in determining plant requirements					
	Select plant and seed varieties to be used					
	Determine correct slope for adequate drainage					
	Calculate square footage of lawn					
	Calculate cubic measurements of soil					
	Identify the hardscape elements of a landscape design					
	Identify standard drafting equipment and the functions of each type					
	Lay out landscape designs using drafting equipment					
	Lay out landscape designs using AutoCAD					
	Create spatial concepts					
	Depict existing plant material and objects on a landscape design					
	Draw landscape symbols					
	Locate focal point					
	Use textural triangle					
	Draw plan to scale					
	design residential plantings					

	Design vegetable gardens					
	Design outdoor privacy areas					
	Design commercial plants					
	Design public area plantings					
	Design theme gardens					
	Design service areas					
	Design golf courses					
	Design athletic fields					
	Design xeroscaping					
	Enhance finished plans using color					
	Evaluate landscape plans					
	Construct landscape models					
Competency: Test plant tissues						
Competency Builders:						
	Take plant tissue samples					
	Prepare plant tissues to be tested					
	Perform plant tissue test					
	Record results					
	Interpret the results of plant tissue tests					
Competency: Prepare for landscape and turf installation						
Competency Builders:						
	Interpret landscape plans					
	Determine quantities of materials needed					
	Interpret seed and bulb tag information					
	Determine seeding rates					
	Determine planting depths					
	Determine planting times					
	Determine correct slop for adequate drainage					
	Identify underground utilities in the area					
	Plan planting schedules					
	Plan soil erosion controls					
	Select mulch variety					
Competency: Prepare landscape and turfgrass area						
Competency Builders:						
	Follow general safety precautions related to equipment operation					
	Define area					
	Establish rough grade					
	Create contour					
	Incorporate soil amendments					
	Establish finish grade					

Competency: Establish turf and landscape						
Competency Builders:						
	Follow general safety precautions related to turf and landscape operations					
	Follow landscape plan					
	Plant seeds					
	Plant bulbs					
	Plant annual and perennial plants					
	Plant shrubs					
	Plant ground covers					
	Plant drought-resistant and disease-resistant cultivars					
	Plant endophyte-enhanced turfgrass					
	Plant trees					
	Lower/raise grade around trees					
	Wrap trees					
	Stake and/or guy trees					
	Water-in plant material					
	Lay sod					
	Install landscape fabric					
	Apply mulch					
	Install edging					
	Perform final cleanup					
	Develop turf management schedule					
Competency: Fertilize plants						
Competency Builders:						
	Follow general safety precautions related to the use of fertilizers					
	Identify fertilization practices and terminology					
	Identify types of fertilizers (organic and inorganic (chemical)					
	Identify symptoms of nutrient deficiency					
	Determine nutrient requirements					
	Describe the effects of nitrogen, phosphorus, and potassium on plan growth					
	Determine kind of fertilizer and soil amendments to apply					
	Read and interpret fertilizer labels					
	Interpret manufacturer's fertilization-rate charts					
	Calculate square footage of area to be treated					
	Determine amount of fertilizer and soil amendments to apply					
	Determine application pattern					
	Mix fertilizer solutions					

	Select application method					
	Apply liquid fertilizers manually					
	Apply dry fertilizers manually					
	Calibrate fertilizer application equipment					
	Apply fertilizers using a fertilizer injector					
	Identify symptoms of toxicities					
	Apply organic fertilizers					
	Apply polymers					
	Apply timed-release fertilizer					
	Comply with prescribed chemical re-entry times					
	Identify symptoms of fertilizer burn					
	Follow established safety procedures for storing and handling chemicals fertilizer					
	Follow established safety procedures for storing and handling chemicals and fertilizer					
	Observe safety precautions when handling fertilizer spills					
	Follow procedures for personal cleanup after handling fertilizer					
	Identify the short- and lone-term impact of fertilizer on people and the environment					
	Describe the impact of fertilizers on plant growth and other landscape components					
	Demonstrate fertilizer application techniques					
Competency: Demonstrate mulching and edging practices						
Competency Builders:						
	Identify and explain the different types of mulches and edges					
	Explain the uses of various mulches and edges					
	Explain and demonstrate the proper application of mulch					
	Explain and demonstrate the proper application of edging					
Competency: Prepare and demonstrate planting						
Competency Builders:						
	Identify and demonstrate the proper planting technique for trees					
	Identify and demonstrate the proper planting technique for shrubs					
	Identify and demonstrate the proper planting technique for herbaceous plant material					

Competency: Demonstrate knowledge of pruning						
Competency Builders:						
	Identify and demonstrate the proper pruning technique for trees					
	Identify and demonstrate the proper pruning technique for evergreens					
	Identify and demonstrate the proper pruning technique for shrubs					
	Identify and demonstrate the proper pruning techniques for herbaceous plants					
Competency: Maintain landscape plants						
Competency Builders:						
	Follow general safety precautions related to plant maintenance					
	Cultivate plants					
	Water plants					
	Check for symptoms of over- and underwatering					
	Apply mulches					
	Apply growth-regulating compounds					
	Shear hedges					
	Prune shrubs (e.g., branches, roots, tops)					
	Prune trees (e.g., branches, roots, tops)					
	Remove fallen leaves					
	Remove old flowers					
	Compost plant debris					
	Transplant bulbs, corms, and tubers					
	Maintain plants on arbors and trellises					
	Stake trees					
	Provide plants with protection against adverse weather					
	Perform overwintering tasks for container-grown plants					
Competency: Apply chemical pest-control treatments						
Competency Builders						
	Follow general safety precautions related to the use of chemical pest controls					
	Comply with local, state, federal, and EPA regulations regarding pesticide use					
	Identify pest baits					
	Calibrate application equipment					
	Mix chemicals					
	Load application equipment					
	Apply chemicals using application equipment					
	Follow planned application pattern					

	Follow established procedures for cleaning application equipment					
	Maintain application records					
	Comply with prescribed chemical re-entry times					
	Recognize chemical injuries to plants					
	Identify the symptoms of pesticide poisoning					
	Dispose of pesticide containers					
Competency: Transplant trees and shrubs						
Competency Builders						
	Dig out shrubs and trees					
	Reduce shoot-to-root ratio					
	Ball and burlap trees and shrubs					
	Determine planting depth					
	Transplant trees and shrubs into containers					
	Determine appropriate time of year to transplant plant materials					
	Transplant trees and shrubs from containers to outside locations					
Competency: Operate turf and landscape equipment						
Competency Builders						
	Follow general safety rules for equipment operation and maintenance					
	Perform predeparture functions					
	Mix gas and oil for two-cycle engine					
	Connect front-end-operated equipment					
	Connect 3-point-hitch equipment					
	Attach/detach power take-off equipment					
	Hitch tower equipment					
	Connect hydraulic lines					
	Connect electrical hookups					
	Connect safety chains					
Competency: Construct hardscapes						
Competency Builders						
	Follow general safety precautions related to hardscape construction					
	Select types of wall building materials					
	Design hardscapes					
	Calculate amount of materials needed					
	Select tools for installation					
	Identify grade					
	Assure structure stability					

	Identify drainage techniques					
	Identify brick and paver patterns					
	Install edging					
Competency: Use hand and power tools						
Competency Builders						
	Follow general safety precautions for the use of hand and power tools					
	Identify standard tools and the functions of each					
	Select tools appropriate for given job					
	Follow operating instructions for hand and power tools					
	Set up/adjust tools					
	Clean/lubricate tools					
	Recondition hand tools					
	Sharpen tools					
	Store tools					
	Report damaged tools					
	Troubleshoot problems					

General Safety Precautions

Competency: Maintain safe work environment						
Competency Builders:						
	Follow safety information and updates					
	Organize the work area					
	Maintain the work area in a clean and safe condition					
	Identify hazardous materials					
	Identify the location of material safety data sheets (MSDSs)					
	Comply with job site and equipment safety rules					
	Identify safety devices and the functions of each					
	Maintain safety devices					
	Comply with general-use and restricted-use product regulations					
	Identify nonchemical safety hazards					
	Report nonchemical safety hazards to designated individual or agency					
	Correct nonchemical safety hazards					
	Identify chemical safety hazards					
	Report chemical safety hazards to designated individual or agency					
	Correct chemical safety hazards					
	Document employees' compliance with company regulations regarding controlled-substance use					

Competency: Practice safe work habits						
Competency Builders:						
	Identify the importance of the individual's role in safety					
	Comply with label information					
	Wear job-appropriate protective clothing and equipment					
	Practice safe lifting and carrying methods					
	Interpret safety-symbol signs					
	Check working condition of safety equipment and personal protective equipment					
	Report malfunctioning of safety equipment and person protective equipment					
	Recognize symptoms of chemical poisoning					
	Communicate symptoms of chemical poisoning to designated individual					
Competency: Follow established procedures for the operation and maintenance of vehicular equipment						
Competency Builders:						
	Follow safety rules for equipment operation and maintenance					
	Interpret safety symbols					
	Maintain safety shields on equipment					
	Identify potential equipment safety hazards					
	Report potential equipment safety hazards to designated individual					
	Follow manufacturer's service recommendations					
	Maintain valid operator's license					

Curriculum Pathway Narrative

Ohio University-Lancaster Design Engineering Technology
March 1997

Because of the initiation of Tech Prep pathways, expanded offerings are available at the post secondary level.

It is anticipated that students following the Tech Prep pathways will be better prepared to do college level work. It is expected that no remedial work will be required and it is quite possible some courses can be taken "course credit by examination." Better prepared students entering the program will allow more "in-depth" coverage of competencies requested by employers in the following areas:

- Technical Report Writing
- Mathematics
- Physics
- Verbal Communications

The design industry indicates that graduates need advanced skills in the following areas:

- Computer Aided Drafting/Design
- Computer Skills including an understanding of debugging skills with D.O.S., Windows, Networking, and other areas.
- Civil Engineering Technology Design
- Mechanical Engineering Technology Design

The advanced competencies will be added to the curriculum within the appropriate course offerings.

Industry is seeking graduates who are broadly educated across discipline as well as prepared specifically in technology specialties related to their primary field. The quality of education received at Ohio University-Lancaster and the advantages offered at a university, assure graduates of a competitive edge with their peers.

OHIO UNIVERSITY-LANCASTER 1997-98 DESIGN INDUSTRIAL TECHNOLOGY (A.A.S.)

HEART OF OHIO TECH PREP CONSORTIUM Mechanical Option

Freshman Year Sequence					
Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
IT 101 - Engineering Drawing I	3	IT 102 - Engineering Drawing II	3	IT 115 - Metal Fabrication	3
MATH 113 - Algebra	5	MATH 115 - Pre Calculus	5	MATH 163A - Intro to Calculus	4
CHEM 121 - Principles of Chemistry	4	CHEM 122 - Principles of Chemistry	4	DTCH 150 Computer Aided Drawing I	3
ENG 151 - Freshman Composition	5	CTCH 125 - Intro to Computers	4	MTCH 290 - Materials	3
				Elective	4
TOTAL Credit Hours	17		16		17
Sophomore Year Sequence					
Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
PHYS 201 - Physics: Mechanics	4	PHYS 202 - Physics: Electricity/Heat/Light	4	DTCH 151 - Computer Aided Drawing II	3
DTCH 200 - Mechanics I	4	DTCH 210 - Mechanics II	4	MTCH 220 - Basic Hydraulics	3
ETCH 110 - Basic Electronics	4	DTCH 230 - Tool Design	4	DTCH 220 - Machine Design	3
IT 117 - Basic Metal Machining	3	INCO 103 - Fundamentals of Public Speaking	4	Humanities/Social Science	3 to 5
				DTCH 299 - Special Problems	3
TOTAL Credit Hours	15		16		15 to 17

OHIO UNIVERSITY-LANCASTER **1997-98** **DESIGN INDUSTRIAL TECHNOLOGY (A.A.S.)**

HEART OF OHIO TECH PREP CONSORTIUM **CIVIL OPTION**

Freshman Year Sequence					
Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
IT 101 - Engineering Drawing I	3	**IT 102 - Engineering Drawing II**	3	**IT 121 - Descriptive Geometry**	3
MATH 113 - Algebra	5	**MATH 115 - Pre Calculus**	5	**MATH 163A - Intro to Calculus**	4
CHEM 121 - Principles of Chemistry	4	**CHEM 122 - Principles of Chemistry**	4	**DTCH 150 Computer Aided Drawing I**	3
ENG 151 - Freshman Composition	5	**CTCH 125 - Intro to Computers**	4	**MTCH 290 - Materials**	3
				Elective	4
TOTAL Credit Hours	17		16		17
Sophomore Year Sequence					
Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
PHYS 201 - Physics: Mechanics	4	**PHYS 202 - Physics: Electricity/Heat/Light**	4	**DTCH 151 - Computer Aided Drawing II**	3
DTCH 200 - Mechanics I	4	**DTCH 210 - Mechanics II**	4	**DTCH 251 - Structural Design II**	4
ETCH 110 - Basic Electronics	4	**DTCH 215 - Intro to Fluids, Hydrology, and Hydraulics**	3	**INCO 103 - Fundamentals of Public Speaking**	4
CE 210 - Plane Surveying	4	**DTCH 250 - Structural Design I**	4	**Humanities/Social Science**	3 to 5
				DTCH 299 - Special Problems	3
TOTAL Credit Hours	16		15		17 to 19

Mechanical CAD Drafting

LEVEL		11	12	AD	WS	LL
Competency: Create 2-D orthographic drawings						
Competency Builders:						
	Create primitive drawing entities					
	Draw utilizing absolute Cartesian coordinates					
	Draw utilizing relative Cartesian coordinates					
	Draw utilizing polar coordinates					
	Draw using construction aides (e.g., snaps, grid, snap, etc.)					
	Change drawing attributes					
	Edit drawing entity properties (e.g., color, layer, thickness, linetype)					
	Construct drawing entities (e.g., offset, timer, extend, break, mirror, etc.)					
	Edit drawing entities (e.g., offset, timer, extend, break, mirror, etc.)					
	Set system variables (e.g., units, scale)					
	Use system variables					
	Create layers					
	Name layers					
	Manipulate layers					
	Save files					
	Create back-ups					
	Create hatches, patterns, symbols					
	Recall drawing templates/block					
Competency: Annotate orthographic drawings						
Competency Builders:						
	Create text styles					
	Edit text styles					
	Select text styles					
	Apply notes					
Competency: Dimension orthographic drawings						
Competency Builders:						
	Create dimensions					
	Edit text					
	Control dimension variables/models					

Competency: Control display						
Competency Builders:						
	Apply view control while drawing (e.g., zoom and pan)					
	Control view resolution (e.g., viewers)					
	Save views					
	Display views					
Competency: Extract entity and drawing information						
Competency Builders:						
	Measure distances					
	Measure areas					
	Identify locations					
	List entity characteristics (e.g., length, size, location, properties, etc.)					
Competency: Manage symbols and attributes						
Competency Builders:						
	Create blocks and W-blocks/templates					
	Create nested blocks/templates					
	Insert blocks and drawings/templates					
	Redefine blocks/templates					
	Edit blocks/templates					
	Apply attributes					
Competency: Create 2-D isometric drawings						
Competency Builders:						
	Manipulate snap and grid settings					
	Toggle planes (e.g., left, right, top)					
	Create text styles for each plane					
	Create dimension styles					
	Use dimension styles					
	Create isometric ellipses					
Competency: Create script files						
Competency Builders:						
	Write a slide show script					
	Write a script for setting initial variable settings					
	Write a script for creating a title-block					

Competency: Create custom linetypes						
Competency Builders:						
	Formulate a linetype composed of long dashes					
	Formulate a linetype composed of lines, dashes and dots					
Competency: Apply advanced control display techniques						
Competency Builders:						
	Define camera viewpoints and angle of rotation					
	Control display angle (e.g., d-view, v-point)					
Competency: Apply intermediate drafting skills						
Competency Builders:						
	Prepare sectional views					
	Prepare auxiliary views					
	Identify ANSI symbols					
	Prepare views of drilled and tapped holes, counterbores, countersinks					
	Identify a bill of materials					
	Dimension drawings using ANISy14.5 standards					
	Describe purpose of auxiliary and sectional views					
	Interpret reports and specifications					
	Prepare pictorial drawings					
	Prepare schematics					
	Interpret basic pneumatic/hydraulic standard and symbols					
Competency: Interpret basic prints						
Competency Builders:						
	Visualize object from drawing					
	Interpret orthographic projections					
	Interpret sectional views					
	Interpret detail and assembly drawings					
	Interpret dimensions					
	Interpret tolerances					

Competency: Interpret intermediate prints						
Competency Builders:						
	Interpret screw thread specifications					
	Interpret electrical, pneumatic/hydraulic drawings					
	Interpret schematics					
Competency: Demonstrate knowledge of basic geometric dimensioning and tolerancing						
Competency Builders:						
	Identify geometric characteristics and symbols (i.e., flatness, straightness, roundness, cylindricity, profile of line, profile of surface, perpendicularly, angularity, parallelism, circular, runout, total indicated runout, position, concentricity, and symmetry)					
	Define maximum material condition					
	Define least material condition					
	Define regardless of feature size condition					
	Describe feature control blocks					
	Describe datum surfaces and targets					
	Define flatness (pitch)					
	Define straightness (yaw)					
	Define roundness					
	Define cylindrically					
	Define profile of line					
	Define profile of surface					
	Define perpendicularly					
	Define angularity					
	Define parallelism					
	Define circular runout					
	Define total runout					
	Define true position concept to determine tolerance for location of holes in mating parts					
Competency: Demonstrate dimensioning techniques using CAD						
Competency Builders:						
	Construct arrowheads using various styles/disciplines					
	Apply symbols for surface and texture control					
	Add labels/notes to drawing					
	Interpret decimal tolerance dimensions					

	Dimension arcs					
	Dimension angles					
	Dimension curves					
	Dimension rounded-end shapes					
	Dimension spherical objects					
	Dimension cylindrical objects					
	Dimension cones, pyramids, and prisms					
	Dimension features on circular center line					
	Dimension theoretical pint of intersection					
	Dimension object using rectangular coordinate system					
	Dimension object using polar coordinate system					
	Dimension object using tabular coordinate system					
	Dimension object using ordinate dimensioning system					
Competency: Apply geometric dimensioning and tolerancing using CAD						
Competency Builders:						
	Interpret decimal tolerance dimensions					
	Calculate clearance fit tolerances of mating parts					
	Dimension clearance fit tolerances of mating parts					
	Calculate interference fit tolerances of mating parts					
	Dimension interference fit tolerances of mating parts					
	Calculate tolerances to mating parts using standard fit tables					
	Assign tolerances to mating parts using standard fit tables					
	Apply positional and form tolerancing symbols					
	Apply symbols for true position					
	Apply symbols for maximum material control and regardless of feature size					
	Calculate effects of dimensional stack-up					
	Calculate transitional fit tolerances					
	Dimension transitional fit tolerances					

Electronic CAD Drafting

LEVEL		11	12	AD	WS	LL
Competency: Prepare electrical/electronic CAD drawings						
Competency Builders:						
	Interpret basic electric/electronic standards and symbols					
	prepare schematic drawings					
	Prepare component drawings					
	Prepare logic diagrams					
	Prepare printed circuit board drawings					
	Prepare wiring diagrams					
	Prepare symbol library					
	Demonstrate proper use of electrical templates					
Competency: Prepare pneumatic/hydraulic CAD drawings						
Competency Builders:						
	Interpret basic pneumatic/hydraulic standards and symbols					
	Prepare piping drawings					
	Prepare isometric drawings					
	Prepare graphical symbols					
	Prepare pump and motor drawings					
	Prepare cylinder and piston diagrams					
	Prepare symbol library					
Competency: Demonstrate drafting with electronic symbols						
Competency Builders:						
	Identify common electrical and electronic symbols					
	Demonstrate proper spelling of symbols					
	Identify actual electrical and electronic components					
Competency: Draw electronic schematics						
Competency Builders:						
	Identify electronic symbols through circuits applications					
	Demonstrate basic electronic vocabulary terms					
	Identify basic circuits made up of individual electronics devices					
	Trace an electronic circuit using a schematic					
	Draw a schematic diagram					

Competency: Draw block and logic diagrams						
Competency Builders:						
	Draw a block diagram of an electronic system					
	Draw a logic diagram of an electronic system					
	Draw a flow chart diagram					
Competency: Draw schematics from sketches						
Competency Builders:						
	Draw a schematic diagram from a bread-boarded circuit					
	Draw a schematic diagram fro sketches					
Competency: Draw schematics using a CAD program						
Competency Builders:						
	Demonstrate proper operation of CAD software					
	Draw a complex schematic diagram					
Competency: Demonstrate printed circuit board construction						
Competency Builders:						
	Demosntrate processes used in circuit board construction					
	Demosntrate processes used in integrated circuit manufacturing					
	Layout and construct a circuit on a PC obard					
	Analyze PC board and integrated circuit schematics					
Competency: Draw industrial circuit diagrams						
Competency Builders:						
	Identify industrial schematic symbols					
	Draw an electrical control schematic diagram					

Design Engineering Technology

Applied Trigonometry						
LEVEL		**11**	**12**	**AD**	**WS**	**LL**
Competency: Apply principles of mathematics to engineering problems						
Competency Builders:						
	Explain definitions of trigonometric functions					
	Solve right triangle problems, including application problems					
	Demonstrate use of Pythagorean Theorem					
	Apply law of sines to find measures of sides and angles of a triangle					
	Apply law of cosines to find measures of sides and angles of triangle					
	Identify and use the trig functions for the sum of angles					
	Convert radians and degrees					
	Explain difference between a scalar quantity and a vector quantity					
	Give examples of scalar quantities					
	Give examples of vector quantities					
	Add and subtract vector's graphically					
	Resolve vectors into their rectangular components					
	Add and subtract vectors mathematically					
	Apply vector analysis (mathematical and graphical) to represent and solve force system problems					
	Apply vector analysis (mathematical and graphical) to represent and solve velocity system problems					
Applied Physics						
Competency: Apply principles of engineering to engineering problems						
Competency Builders:						
	Explain English system of units					
	Give examples of the English system of units					
	Demonstrate the use of the English system of units					
	Explain the metric (System International, SI) system of units					
	Give examples of the SI system of units					
	Demonstrate the use of the SI system of units					
	Draw simple free body diagrams					
	Explain the definition of a moment, M=Fd					
	Compute the moment resulting from simple force systems					
	Explain the definition of a couple					
	Compute couples that result from simple force systems					

	Explain static equilibrium					
	Solve simple problems involving static equilibrium					
	Explain the definition of stress					
	Explain the definition of strain					
	Explain the definition of deformation					
	Determine stresses that result from externally applied loads					
	Determine the strain that results from externally applied loads					
	Determine the deformation that results from externally applied loads					
	Demonstrate the relationship among force, area, and stress					
	Perform simple experiments involving stress					
	Demonstrate the relationship among strain, deformation, and length					
	Perform simple experiments involving deformation and strain					

Design Engineering Technology

Basic Construction Materials

LEVEL		11	12	AD	WS	LL
Competency: Perform basic area, volumetric, strength and density calculation						
Competency Builders:						
	Perform mass, volume, specific weight and specific gravity calculations					
	Perform force, area, stress and strength calculations					
Competency: Use industry standard references and specifications to determine material acceptability						
Competency Builders:						
	Describe quality control and quality assurance in by conformance to industry codes, specifications, standards and formats					
	Differentiate amongst industry codes, specifications, standards and formats and cite applicable examples					
	Compare industry manufacturer's data to standard references and specifications to determine material acceptability					
Competency: Perform basic soils analyses						
Competency Builders:						
	Describe soil particles by grain size in accordance with American Association of State Highway Transportation Officials (AASHTO) standards					
	Determine the moisture content of a soil sample in accordance with American Society of Testing Materials, ASTM D-2216 or ASTM D-4643					
	Determine Soil Particle Size by Sieve Analysis in accordance with ASTM D-442					
	Describe the procedure for performing soil compaction test by Proctor Method in accordance with ASTM D-698 and ASTM D-1557					
	Differentiate between the procedures for Standard and Modified Proctor Tests					
Competency: Describe the manufacture and list the basic test applicable to bituminous (flexible) pavement						
Competency Builders:						
	Describe the process in the manufacture and placement of bituminous (flexible) pavement					
	List the tests and inspection procedures in the					

	manufacture and placement of bituminous (flexible) pavement					
	Describe the structure (base, intermediate and wearing coarses) of various types of bituminous (flexible) pavement systems including applications					
Competency: Perform basic Portland Cement Concrete tests						
Competency Builders:						
	Properly prepare, weigh and mix the ingredients for Portland Cement Concrete					
	Describe the proper procedure for sampling freshly-mixed concrete in accordance with ASTM C-172					
	Obtain temperature of freshly-mixed Portland Cement Concrete in accordance with ASTM C-1064					
	Perform the Slump Test of Portland Cement Concrete in accordance with ASTM C-143					
	Describe the proper procedure for determining the Air Content of freshly-mixed Portland Cement concrete by Pressure Method in accordance with ASTM C-231					
	Perform the correct procedure for Casting and Curing Portland Cement Concrete Test Specimens in the Field in accordance with ASTM C-31					
	Perform the correct procedure for determining the Compressive Strength of Cylindrical Concrete Specimens in accordance with ASTM C-39					
	List three (3) methods, including corresponding ASTM specification number of testing the strength of "in place" concrete					
Competency: Describe the manufacture, perform basic testing and build simple structures of masonry products						
Competency Builders:						
	Describe the major operations in the manufacture of brick					
	Describe the major operations in the manufacture of concrete masonry units (CMU's)					
	Properly prepare, weigh and mix the ingredients for Portland Cement Mortar in accordance with ASTM C-150					
	Construct a small masonry wall					
	Describe the correct procedure for testing Concrete Masonry Units in accordance with ASTM C-140 for conformance with ASTM C-90					
	Describe the correct procedure for Sampling and Testing Brick and Structural Clay Tile in accordance with ASTM C-67 and ASTM C-216					

Competency: List the materials, describe the properties, applications and testing of metals in Division 0500 for the Construction Specification Institute format						
Competency Builders:						
	List the metals, each metal's application and resistance to corrosion					
	Describe the typical metals test for strength					
	Identify the critical points, corresponding stress and strain and the ranges on a stress/strain curve					
	Given the characteristic shapes of specific stress/strain curves; identify the specific metal					
	Given American Institute of Steel Construction (AISC) standards designations for rolled sections, identify the specific shape, by picture/graphic, and where applicable list the sections' name and weight per lineal foot					
	List the major methods of joining steel sections					
	By ASTM designation, list the various alloys of structural steel and corresponding properties					
	Differentiate between the chemical composition and associated properties of cast iron and steel					
Competency: List the general classifications and grades and applications, describe defects, perform basic strength tests and construct a simple structure of wood products						
Competency Builders:						
	Differentiate between softwoods and hardwoods					
	Describe the possible defects in wood					
	In accordance with US Department of Commerce Product Standard PS 20, list the various grade of softwoods and give specific examples					
	Rough frame a wall having at least one (1) opening or penetration					
	List the various types of manufactured wood (i.e., plywood, oriented strand board, etc.) in accordance with American Plywood Association (APA) Standards and cite examples					
	In accordance with American Plywood Association (APA) Standards, describe the grades and ratings applicable to manufactured wood systems					

Engineering Mechanics

LEVEL		**11**	**12**	**AD**	**WS**	**LL**
Competency:						
Competency Builders:						

DRAFT

Columbus State Community College **Spring 1997** **Engineering Technologies Core Model**

College Pathway: Electronic Engineering Technology

March 25, 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
ENGL 101 Beginning Composition	3	ENGL 102 Essay & Research	3	ENGL 204 Technical Writing	3	EET 250 Electronic Communications	4	EET 254 Electronics Fabrication	2	EET 2XX Technical Elective	3
~~MATH 111 Technical Mathematics I~~	4	PHYS 177 Tech Physics (Mechanics)	4	MATH 151 Calculus & Analytic Geometry I	5	EET 251 Electronic Communications Laboratory	2	EET 260 Industrial Electronics	4	EET 262 Digital Communications & Telecommuncations	3
~~EET 110 Electronic Drafting~~	2	MATH 113 Technical Mathematics III	4	EET 241Electronic Devices Circuit Analysis	4	MATH 152 Calculus & Analytic Geometry II	5	EET 261 Industrial Electronics Laboratory	2	EET 264 Fiberoptic Communications	3
~~EET 111 DC Fundamentals~~	4	EET 130 Electronic Devices	4	EET 242 Electronic Device Circuit Analysis Lab	2	EET 252 Microprocessors	4	SSCI 101, 102, 103, OR 104 (select one)	5	EET 255 Instrumentation & Controls	3
~~EET 112 DC Laboratory~~	2	EET 131 Electronic Devices Laboratory	2	EET 243 Digital Devices	4	EET 253 Microprocessor Laboratory	2	~~EET 144 PC Hardware~~	3	HUM 111, 112, 113, 151, o4 152 (select one)	5
MATH 112 Technical Mathematics II	4	EET 132 Digital Fundamentals	3	EET 244 Digital Devices Laboratory	2	PHYS 178 Technical Physics (Heat/Light/Sound)	4				
EET 120 AC Fundamentals	4	COMM 105 Speech	3								
EET 121 AC Laboratory	2										

Struck-out courses = those that students may articulate or pass via proficiency testing.
Shaded courses = advanced skills added to the curriculum.

OHIO UNIVERSITY - LANCASTER 1997-98 ELECTRONICS TECHNOLOGY (A.A.S.)

HEART OF OHIO TECH PREP CONSORTIUM

Freshman Year Sequence

Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
ETCH 110 - Basic Electronics	4	ETCH 111 - A.C. And D.C. Circuit Analysis	4	ETCH 112 - Industrial Electronics	4
IT 101 - Engineering Drawing	3	BA 101 - Business and It's Environment or ECON 103 - Principles of Microeconomics	4	ETCH 120 - Digital Electronics	4
IT 115 - Metal Fabrication	3	MATH 115 - Pre-Calculus or MATH 118 - Elementary Applied Mathematics	4 or 5	INCO 103 - Public Speaking	4
MATH 113 - Algebra	5	PSY 101 - General Psychology	5	MATH 163A - Introduction to Calculus or MATH 263A - Analytic Geometry and Calculus	4
TOTAL Credit Hours	15		17 or 18		16

Sophomore Year Sequence

Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
ETCH 220 - Electrical Motors, Control Circuits, and Computers	4	ETCH 260 - Data Communications	4	ENG 151 - Freshman Composition	5
ETCH 236A - Microprocessor & Computer Basics	4	ETCH 221A - Programmable Controllers, Instrumentation & Process Control	4	ETCH 221B - Continuation of 221A	4
PHYS 201 - Introduction to Physics	4	ETCH 236B - Microprocessor & Computer Interfacing	4	ETCH 288 - Personal Computer Maintenance	4
ETCH 289 - Electronic Trouble-Shooting & Repair	4	PHYS 202 - Introduction to Physics	4	Elective	1 to 3
Elective	1 to 3				
TOTAL Credit Hours	17 to 20		16		14 to 16

ELECTRONICS TECHNOLOGY

HIGH SCHOOL EXIT TITLES

- Component Assembler
- Electronics Technician
- Salesperson

A.A.S. DEGREE JOB TITLES

- Junior Engineer
- Electrical Technologist
- Instrumentation Technician
- Computer Maintenance Technician
- Field Service Engineer
- Salesperson
- Industrial Maintenance Technician

Mechanical CAD Drafting

LEVEL		11	12	AD	WS	LL
Competency: Create 2-D orthographic drawings						
Competency Builders:						
	Create primitive drawing entities					
	Draw utilizing absolute Cartesian coordinates					
	Draw utilizing relative Cartesian coordinates					
	Draw utilizing polar coordinates					
	Draw using construction aides (e.g., snaps, grid, snap, etc.)					
	Change drawing attributes					
	Edit drawing entity properties (e.g., color, layer, thickness, linetype)					
	Construct drawing entities (e.g., offset, timer, extend, break, mirror, etc.)					
	Edit drawing entities (e.g., offset, timer, extend, break, mirror, etc.)					
	Set system variables (e.g., units, scale)					
	Use system variables					
	Create layers					
	Name layers					
	Manipulate layers					
	Save files					
	Create back-ups					
	Create hatches, patterns, symbols					
	Recall drawing templates/block					
Competency: Annotate orthographic drawings						
Competency Builders:						
	Create text styles					
	Edit text styles					
	Select text styles					
	Apply notes					
Competency: Dimension orthographic drawings						
Competency Builders:						
	Create dimensions					
	Edit text					
	Control dimension variables/models					

Competency: Control display						
Competency Builders:						
	Apply view control while drawing (e.g., zoom and pan)					
	Control view resolution (e.g., viewers)					
	Save views					
	Display views					
Competency: Extract entity and drawing information						
Competency Builders:						
	Measure distances					
	Measure areas					
	Identify locations					
	List entity characteristics (e.g., length, size, location, properties, etc.)					
Competency: Manage symbols and attributes						
Competency Builders:						
	Create blocks and W-blocks/templates					
	Create nested blocks/templates					
	Insert blocks and drawings/templates					
	Redefine blocks/templates					
	Edit blocks/templates					
	Apply attributes					
Competency: Create 2-D isometric drawings						
Competency Builders:						
	Manipulate snap and grid settings					
	Toggle planes (e.g., left, right, top)					
	Create text styles for each plane					
	Create dimension styles					
	Use dimension styles					
	Create isometric ellipses					
Competency: Create script files						
Competency Builders:						
	Write a slide show script					
	Write a script for setting initial variable settings					
	Write a script for creating a title-block					

Competency: Create custom linetypes						
Competency Builders:						
	Formulate a linetype composed of long dashes					
	Formulate a linetype composed of lines, dashes and dots					
Competency: Apply advanced control display techniques						
Competency Builders:						
	Define camera viewpoints and angle of rotation					
	Control display angle (e.g., d-view, v-point)					
Competency: Apply intermediate drafting skills						
Competency Builders:						
	Prepare sectional views					
	Prepare auxiliary views					
	Identify ANSI symbols					
	Prepare views of drilled and tapped holes, counterbores, countersinks					
	Identify a bill of materials					
	Dimension drawings using ANISy14.5 standards					
	Describe purpose of auxiliary and sectional views					
	Interpret reports and specifications					
	Prepare pictorial drawings					
	Prepare schematics					
	Interpret basic pneumatic/hydraulic standard and symbols					
Competency: Interpret basic prints						
Competency Builders:						
	Visualize object from drawing					
	Interpret orthographic projections					
	Interpret sectional views					
	Interpret detail and assembly drawings					
	Interpret dimensions					
	Interpret tolerances					

Competency: Interpret intermediate prints						
Competency Builders:						
	Interpret screw thread specifications					
	Interpret electrical, pneumatic/hydraulic drawings					
	Interpret schematics					
Competency: Demonstrate knowledge of basic geometric dimensioning and tolerancing						
Competency Builders:						
	Identify geometric characteristics and symbols (i.e., flatness, straightness, roundness, cylindricity, profile of line, profile of surface, perpendicularly, angularity, parallelism, circular, runout, total indicated runout, position, concentricity, and symmetry)					
	Define maximum material condition					
	Define least material condition					
	Define regardless of feature size condition					
	Describe feature control blocks					
	Describe datum surfaces and targets					
	Define flatness (pitch)					
	Define straightness (yaw)					
	Define roundness					
	Define cylindrically					
	Define profile of line					
	Define profile of surface					
	Define perpendicularly					
	Define angularity					
	Define parallelism					
	Define circular runout					
	Define total runout					
	Define true position concept to determine tolerance for location of holes in mating parts					
Competency: Demonstrate dimensioning techniques using CAD						
Competency Builders:						
	Construct arrowheads using various styles/disciplines					
	Apply symbols for surface and texture control					
	Add labels/notes to drawing					
	Interpret decimal tolerance dimensions					

	Dimension arcs					
	Dimension angles					
	Dimension curves					
	Dimension rounded-end shapes					
	Dimension spherical objects					
	Dimension cylindrical objects					
	Dimension cones, pyramids, and prisms					
	Dimension features on circular center line					
	Dimension theoretical pint of intersection					
	Dimension object using rectangular coordinate system					
	Dimension object using polar coordinate system					
	Dimension object using tabular coordinate system					
	Dimension object using ordinate dimensioning system					
Competency: Apply geometric dimensioning and tolerancing using CAD						
Competency Builders:						
	Interpret decimal tolerance dimensions					
	Calculate clearance fit tolerances of mating parts					
	Dimension clearance fit tolerances of mating parts					
	Calculate interference fit tolerances of mating parts					
	Dimension interference fit tolerances of mating parts					
	Calculate tolerances to mating parts using standard fit tables					
	Assign tolerances to mating parts using standard fit tables					
	Apply positional and form tolerancing symbols					
	Apply symbols for true position					
	Apply symbols for maximum material control and regardless of feature size					
	Calculate effects of dimensional stack-up					
	Calculate transitional fit tolerances					
	Dimension transitional fit tolerances					

Electronic CAD Drafting

LEVEL		11	12	AD	WS	LL
Competency: Prepare electrical/electronic CAD drawings						
Competency Builders:						
	Interpret basic electric/electronic standards and symbols					
	prepare schematic drawings					
	Prepare component drawings					
	Prepare logic diagrams					
	Prepare printed circuit board drawings					
	Prepare wiring diagrams					
	Prepare symbol library					
	Demonstrate proper use of electrical templates					
Competency: Prepare pneumatic/hydraulic CAD drawings						
Competency Builders:						
	Interpret basic pneumatic/hydraulic standards and symbols					
	Prepare piping drawings					
	Prepare isometric drawings					
	Prepare graphical symbols					
	Prepare pump and motor drawings					
	Prepare cylinder and piston diagrams					
	Prepare symbol library					
Competency: Demonstrate drafting with electronic symbols						
Competency Builders:						
	Identify common electrical and electronic symbols					
	Demonstrate proper spelling of symbols					
	Identify actual electrical and electronic components					
Competency: Draw electronic schematics						
Competency Builders:						
	Identify electronic symbols through circuits applications					
	Demonstrate basic electronic vocabulary terms					
	Identify basic circuits made up of individual electronics devices					
	Trace an electronic circuit using a schematic					
	Draw a schematic diagram					

Competency: Draw block and logic diagrams						
Competency Builders:						
	Draw a block diagram of an electronic system					
	Draw a logic diagram of an electronic system					
	Draw a flow chart diagram					
Competency: Draw schematics from sketches						
Competency Builders:						
	Draw a schematic diagram from a bread-boarded circuit					
	Draw a schematic diagram fro sketches					
Competency: Draw schematics using a CAD program						
Competency Builders:						
	Demonstrate proper operation of CAD software					
	Draw a complex schematic diagram					
Competency: Demonstrate printed circuit board construction						
Competency Builders:						
	Demonstrate processes used in circuit board construction					
	Demonstrate processes used in integrated circuit manufacturing					
	Layout and construct a circuit on a PC board					
	Analyze PC board and integrated circuit schematics					
Competency: Draw industrial circuit diagrams						
Competency Builders:						
	Identify industrial schematic symbols					
	Draw an electrical control schematic diagram					

Electronics Technology

Electronics Basics (Ohio University--Lancaster)						
LEVEL		**11**	**12**	**AD**	**WS**	**LL**
Competency: Demonstrate proficiency in analyzing basic electronic circuits						
Competency Builders:						
	Construct simple, series, and parallel resistive circuits					
	Calculate and measure voltage, current, power and resistance of S/F, DC circuits					
	Calculate and measure resistor-capacity (RC) for time constraints					
	Demonstrate safe use of test equipment, including DMM (Digital Multimeter) and logic probe					
	Calculate total capacitance of a S-P circuit					
	Identify basic schematic symbols					
	Identify basic electrical/electronic components					
	Construct and test a single stage C-E (common emitter) amplifier with NPN transistor					
	Identify resistor values by color code					
	Identify basic integrated circuits by type, number, and date					
	Identify the various computer number systems (Binary, Hex BCD, and Octal)					
	Perform conversions among the number systems					
Competency: Understand basic electrical terms and concepts						
Competency Builders:						
	Define voltage					
	Define current					
	Define resistance					
	Define real power					
	Define reactive power					
	Define apparent power					
	Define inductance					
	Define inductive reactance					
	Define capacitance					
	Define capacitive reactance					
	Define impedance					
	Define mutual inductance					
	Compare open vs short circuits					
	Define Henry					

	Define OHM					
	Define Farad					
	Define Ampere					
	Define Kirchhoff's Voltage Law					
	Define Kirchhoff's Current Law					
	Define effective (R.M.S.) voltage					
	Define byte					
	Define bit					
Competency: Understand the major application of basic electrical devices						
Competency Builders:						
	Explain the purpose of conductors					
	Define insulators					
	Define switches					
	Explain the purpose of resistors					
	Explain the purpose of capacitors					
	Explain the purpose of coils					
	Explain the purpose of transformers					
	Explain the purpose of Diode and LED					
	Explain the purpose of BJT transistor					
	Explain the purpose of CMOS circuit					
	Explain the purpose of and gate					
	Explain the purpose of or gate					
	Explain the purpose of not circuit					
	Explain the purpose of logic probe					
	Explain the purpose of flip flop					
	Explain the purpose of ROM/RAM/PROM memory					

Electronics Technology

DC Fundamentals

EET 111

LEVEL		11	12	AD	WS	LL
Competency: Demonstrate proficiency in the solution of DC circuit problems						
Competency Builders:						
	Solve problems using Ohm's Law, and power formula					
	Solve problems for series circuits, voltage, current, and resistance					
	Demonstrate the ability to analyze voltage divider circuits using Kirchhoff's Law					
	Solve problems for parallel circuits to find unknown values of resistance, current, and voltage					
	Demonstrate the ability to analyze current divider using Kirchhoff's Current Law					
	Solve problems for series-parallel circuits for unknown values of resistance, current, and voltage					
	Analyze series-parallel circuits using Kirchhoff's Laws					
Competency: Analyze DC circuits using common theorems						
Competency Builders:						
	Analyze DC circuits using Superposition Theorem					
	Analyze DC circuits using Thevenin's Theorem					
	Analyze DC circuits using Norton's Theorem					
	Analyze DC circuits using Millman's Theorem					
	Analyze DC circuits using Maximum Power Transfer Theorem					
Competency: Analyze complex electrical problems using network analysis						
Competency Builders:						
	Analyze DC circuits for resistance, current, and voltage using Branch Analysis					
	Analyze DC circuits for resistance, current, and voltage using Mesh Analysis					
	Analyze DC circuits for resistance, current, and voltage using Node Analysis					

DC Laboratory
EET 112

LEVEL		**11**	**12**	**AD**	**WS**	**LL**
Competency: Demonstrate resistance, voltage and current measurements						
Competency Builders:						
	Identify resistor values and tolerances by color code					
	Describe the operation of a valuable resistor					
	Demonstrate the proper procedure for measuring voltage, and current in a DC circuit					
Competency: Demonstrate Ohm's Law						
Competency Builders:						
	Verify Ohm's law by measuring voltage, and current with various resistors circuits					
	Apply the three power formulas					
Competency: Demonstrate properties of series circuits						
Competency Builders:						
	Measure voltages, and currents for a series circuits					
	Analyze measured values to calculated values					
Competency: Demonstrate properties of parallel circuits						
Competency Builders:						
	Measure voltages, and currents for a parallel circuits					
	Analyze measured values to calculated values					
Competency: Demonstrate properties of complex circuits						
Competency Builders:						
	Measure voltages, and currents for a complex circuit					
	Analyze measured values to calculated values					
Competency: Analyze voltage sources and loading effects						
Competency Builders:						
	Demonstrate how the connection of load to a voltage source will effect the terminal voltage					
	Demonstrate how to approximate an ideal voltage source					

Competency: Demonstrate circuit theorems and conversions						
Competency Builders:						
	Demonstrate circuits theorems using measurements and calculations					
	Analyze calculated and measured values in a more complex circuit					
Competency: Demonstrate network circuit analysis						
Competency Builders:						
	Utilize the K-loop program form the student disk to analyze complex DC circuits					
Competency: Demonstrate troubleshooting techniques						
Competency Builders:						
	Demonstrate how various open and shorts conditions effect a series parallel circuit					

Electronics Technology

PC Hardware EET 144						
LEVEL		**11**	**12**	**AD**	**WS**	**LL**
Competency: Perform elementary PC Hardware assembly and disassembly procedures						
Competency Builders:						
	Identify specific internal components, including power supply, motherboard, disk drives, memory components, expansion slots, internal battery, and modem cards					
	List PC disassembly procedures, including static electricity precautions					
	Explain the reason for caution regarding static electricity when opening up a PC					
	Remove the cover from the PC					
	Replace the CMOS battery					
	Connect external component parts, such as monitors and keyboard					
Competency: Install a modem						
Competency Builders:						
	Describe the function of a modem					
	Describe features of telecommunications via modem, including CCITT recommended standards, ISDN, facsimile boards and machines, and scanners					
	Explain the operation of telephone connections and modems					
	Install a modem in a PC					
	Install the required modem software					
	Troubleshoot the modem and software for correct function					
Competency: Use a modem						
Competency Builders:						
	Describe the functions of various telecommunications resources available through use a modem, including bulletin boards, sources, on-line services, e-mail, banking by modem, telecommuting, and internet					
	Demonstrate use of a modem to access on-line reference sources such as libraries, bulletin board systems, and internet					
	Download information from an on-line service					
	Send a fax					

Competency: Perform diagnosis of PC hardware and software						
Competency Builders:						
	Use a standard text editor to make hardware guiding changes to the Auto Exec. Bat and config. Sys files					
	Format disks					
	Move directories and files					
	Rename directories and files					
	Delete directories and files					
	Check disks for viruses					
	Apply proper software and techniques to remove viruses and immunize files					
	Explain the importance of scheduling automatic virus detection and cleaning					
	Defragment files on a hard disk so as to optimize (speed up) access to these files					
Competency: Use disk recovery utilities						
Competency Builders:						
	Define the following terminology related to disk problems: booting from a floppy, unerase software, jumbled FAT, head crash, mean time before failure, crash recovery, disk backup, lost clusters, CMOS information restoration, Partition table information repair, surface scan, disk revitalization, emergency disk					
	Use a recovery disk to boot a PC that has lost its self-boot ability					
	Diagnose and fix common disk problems (with one of the popular disk, repair utilities)					
	Restore CMOS values using the PC's BIOS setup routine					
	Create a backup of important disk data					
	Create an emergency boot disk					
Competency: Diagnose and manage memory problems						
Competency Builders:						
	Define the types of memory found in the PC					
	Use memory testing utilities to inspect existing memory as to quantity, speed, etc.					
	Specify types of memory upgrades, current cost, and sources for memory in a particular PC					
	Install memory upgrade modules					
	Test memory upgrade modules					
	Explain the functions of ROM BIOS					
	Explain ROM BIOS compatibility and BIOS differences					

	Use the ROM BIOS					
	Replace the ROM BIOS chips					
Competency: Perform hardware support operations on disk drives						
Competency Builders:						
	Describe the differing purposes of floppy drives, hard drives, and CD ROM drives					
	Install a floppy drive					
	Format and set up boot traps on a floppy					
	Discuss aspects of hard drives, including capacity, speed, partitioning, formatting, installation, and multiple drives					
	Install one or two hard drives in a computer system					
	Partition and format hard drives					
	Discuss aspects of CD ROM drives, including capacity, installation, and setup					
	Install a CD ROM drive					
	Use a CD ROM drive					
Competency: Perform PC hardware support operations on motherboards and PC systems						
Competency Builders:						
	Identify motherboard expansion slots					
	Set the interrupt level on expansion cards					
	Set the DMA on expansion cards					
	Set the I.O. port address on expansion cards					
	Explain the difference between monochrome EGA and VGA monitors					
	Chose a cable for each type of monitor					
	Connect a keyboard					
	Identify a parallel printer cable, a serial data cable, and a joystick cable					
Competency: Evaluate system versus component purchase options						
Competency Builders:						
	Specify a complete prepackaged PC system (striving for parity with the prepackaged PC system) that uses parts assembled from many vendors, by using vendor catalogs, outside vendors, magazine advertisements, or any other sources of information					
	Compare the prices and capabilities of the prepackaged versus the assembled PC systems					

	Recommend and justify the purchase of one of the two systems, based on the comparison of prices and capabilities					
Competency: Perform a customized upgrade on a PC						
Competency Builders:						
	Apply knowledge and skills gained in the previous PC hardware competencies to specify parts from vendors for customization of a PC					
	Apply knowledge and skills gained in the previous PC hardware competencies to add devices and customized a PC					

HEART of OHIO TECH PREP CONSORTIUM

1997

Engineering Technologies Core Model

PART II.B:
Secondary Tech Prep
Academic Competencies (Unleveled)

HEART of OHIO TECH PREP CONSORTIUM

SECONDARY ACADEMIC COMPETENCIES

Final, approved update, October 1997
Curriculum Pathways Committee

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HEART of OHIO TECH PREP CONSORTIUM

SECONDARY ACADEMIC COMPETENCIES

Reviewed & approved, October 1997

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PREFACE

How to Use This Competency List

The competencies listed in this document are exit competencies for the secondary component of Tech Prep programs. They represent what Tech Prep high school students are expected to be able to do by the end of grade 12.

Information offered in this preface includes:

- Philosophy underpinning Tech Prep academics
- Mathematics education as an example
- Bottom line for Tech Prep academics instruction
- Matrix indicating core and program-specific academic competencies
- Notes on organization of the competency list
- Acknowledgements

Background: What's Different about Tech Prep Academic Competencies?

Tech Prep is a systemic educational reform movement intended to prepare students for the technology-based occupations of the coming century. Here are some key points to know about Tech Prep secondary academics:

- ✔ Tech Prep academics are college preparatory academics for concrete learners. (That's 90% of all of us.)

- ✔ The goal is to prepare Tech Prep students to enter the college of their choice without the need for academic remediation.

- ✔ What makes Tech Prep academics different from traditional college prep academics is not the content. It is the way in which it is taught.

The following section uses *mathematics* as an example to illustrate the necessity for this approach, and some related methodologies.

Mathematics: A Prime Example

If we accept the premise that Tech Prep programs will demonstrate systemic educational change by providing new, creative, and innovative options for students, then we must agree that what has passed for mathematics education in the past will not and can not continue as mathematics education in the future.

The follow excerpts from current literature support this position:

> Evidence from many sources shows that the least effective mode for mathematics learning is the one that prevails in most of America's classrooms: lecturing and listening. Despite daily homework, for most students and most teachers mathematics continues to be primarily a passive activity: teachers prescribe; students transcribe. Students simply do not retain for long what they learn by imitation from lectures, worksheets, or routine homework. Presentation and repetition help students do well on standardized tests and lower-order skills, but they are generally ineffective as teaching strategies for long-term learning, for higher-order thinking, and for versatile problem solving. (National Research Council. Everybody Counts — A Report to the Nation on the Future of Mathematics Education. 1989, p. 57.)

The National Council of Teachers of Mathematics have proposed five general goals for all K-12 students:

> 1. That students learn to value mathematics,
> 2. That students become confident in their ability to do mathematics,
> 3. That students become mathematics problem-solvers,
> 4. That students learn to communicate mathematically, and
> 5. That students learn to reason mathematically....
>
> Toward this end, we see classrooms as places where interesting problems are regularly explored using important mathematical ideas. Our premise is that ***what*** a student learns depends to a great degree on ***how*** he or she has learned it.... This vision sees students studying much the same mathematics currently taught, but with quite a different emphasis. (NCTM. Curriculum and Evaluation Standards for School Mathematics. 1989, p. 5.)

For NCTM's vision for mathematics education to be realized, the vision of how students learn mathematics must shift "toward investigating, formulating, representing, reasoning, and applying a variety of strategies to the solution of problems . . . and away from being shown or told, memorizing and repeating.... {And the] role of teachers toward 'questioning and listening' . . . and away from 'telling' students what to do..." (NCTM, Assessment Standards for School Mathematics,1995, p. 2).

Alternative methods for delivery of mathematics education should address the following:

1. Students should experience mathematics as active, engaging, and dynamic.
2. Mathematics instruction should at all times make appropriate use of technology, especially graphing calculators and computers.
3. Mathematics courses should make extensive use of writing assignments, open-ended projects, and cooperative learning groups.
4. Faculty should use a variety of teaching strategies and should employ a broad range of examples.

(Mathematical Sciences Education Board. Expectations for Mathematics Education from High School through Career.)

The Bottom Line for Teaching

As shown above, we can not continue to teach mathematics — or for that matter, any high school academics — the way they have always been taught. The Heart of Ohio Tech Prep Consortium officially encourages the kind of systemic change spelled out in the example just presented using mathematics education.

In other words, TECH PREP HIGH SCHOOL ACADEMIC INSTRUCTION SHOULD --

☞ **Focus on developing critical thinking and problem-solving skills**

☞ **Incorporate cooperative learning techniques**

☞ **Include written group projects, developed in conjunction with business and industry, that address real-world problems**

☞ **Actively embrace career development and school-to-work opportunities**

☞ **Encourage global thinking and learning through multidisciplinary instruction, projects, and experiences**

Core Academic Competencies and Program-Specific Competencies

The matrix on the next page shows--

1. Core competencies required of ALL TECH PREP STUDENTS by the time they complete high school.

2. Program-specific competencies required by the end of grade 12 FOR STUDENTS WHO SELECT A PARTICULAR TECH PREP SECONDARY PROGRAM that is linked with one or more college Tech Prep programs.

Important notes:

✔ The grade and sequence in which Tech Prep academic competencies are taught are up to the local school (though in some cases, this is determined naturally by progression of prerequisite skills).

✔ Regardless of the sequence, every student completing a high school Tech Prep program should have attained the academic competencies (both core and program-specific) by the time he or she completes the high school Tech Prep program.

- ✔ The core competencies and program-specific competencies required by the end of grade 12 are the minimum requirements for successful completion of the high school Tech Prep program and subsequent matriculation into a college Tech Prep program. If time and resources allow, any school may choose to enrich its Tech Prep programs by teaching additional competencies that enhance the students' college and/or employment readiness.

- ✔ Instructors will notice that competencies listed in their discipline are generally equivalent to the college prep content they already teach (e.g., Algebra I, Geometry, Biology, Global History, etc.).

- ✔ Schools are advised to retain traditional names for academic courses (e.g., Algebra II, English IV) on the student's official transcript, to support their acceptance by selective-admissions colleges and universities, as well as for scholarship eligibility (e.g., NCAA). Although schools may organize and sequence Tech Prep academic course content differently from traditional college preparatory courses, students should have attained all of the requisite competencies by the end of grade 12, thereby addressing the expectations of these organizations.

MATRIX NO. 1:
CORE ACADEMIC COMPETENCIES REQUIRED OF ALL TECH PREP STUDENTS BY THE END OF GRADE 12

ACADEMIC COMPETENCIES				Individual Development Competencies	Technology Literacy Competencies	Professional Options (Technical & Employability Competencies)
Communications Literacy*	Mathematics Literacy*	Science Literacy*	Social/Cultural Literacy*			
All competencies listed	• Algebra • Numbers & number relations • Data analysis & probability	• Lab safety procedures • Scientific process • Biology/ecology	All competencies listed	All competencies listed	All competencies listed	See specific program model (separate document)
*Four years of college-prep English	*Minimum three years of college prep mathematics -- see Matrix No. 2 for additional program-specific requirements	*Minimum two years of lab science, one of which is biology — see Matrix No. 2 for additional program-specific requirements	*Four years of college-prep humanities			

MATRIX NO. 2:
ADDITIONAL ACADEMIC COMPETENCIES REQUIRED FOR SPECIFIC TECH PREP PROGRAMS IN GRADES 11-12*

(*In addition to core competencies required of all students)

TECH PREP PROGRAM MODEL (Gr. 11-12)	Mathematics Literacy Competencies*	Science Literacy Competencies*	Professional Options Competencies (Technical & Employability)
Automotive/Diagnostic Technologies	• Geometry • Technical Algebra	• Chemistry • Physics	See separate program model documentation
Business Technologies Core Model:			
▪ Computerized Business Technology (CBT) Career Major	• Geometry • Technical Algebra	• Chemistry or Physics *(recommended but not required)*	See separate program model documentation
▪ Business Management Career Major *(in process)*	TBA	TBA	TBA
Construction Technologies	• Technical Algebra • Geometry and/or Technical Trigonometry *(recommended but not required)*	• Physics • Chemistry *(recommended by not required)*	See separate program model documentation
Engineering Technologies Core Model:			
▪ Architecture/ Construction Career Major	Select two: • Technical Algebra • Geometry • Technical Trigonometry	• Chemistry • Physics	See separate program model documentation

MATRIX NO. 2:
ADDITIONAL ACADEMIC COMPETENCIES REQUIRED FOR SPECIFIC TECH PREP PROGRAMS IN GRADES 11-12*

(*In addition to core competencies required of all students)

TECH PREP PROGRAM MODEL (Gr. 11-12)	Mathematics Literacy Competencies*	Science Literacy Competencies*	Professional Options Competencies (Technical & Employability)
Engineering Core Model program, continued:	Select two: • Technical Algebra • Geometry • Technical Trigonometry	• Chemistry • Physics	See separate program model
▪ Design Engineering Career Major			
▪ Electronics Technology Career Major			
▪ Graphic Communications Career Major			
▪ Landscape Career Major			
▪ Manufacturing Career Major			
Environmental Technologies	• Geometry • Technical Algebra	• Chemistry • Environmental Geology *(specific to this program; see separate program model documentation)*	See separate program model documentation
Information Engineering Technologies	• Geometry • Technical Algebra	• Chemistry • Physics	See separate program model documentation
Multi-Competency Health Technologies ("Allied Health")	• Technical Algebra	• Chemistry	See separate program model documentation

Notes on Organization of the Competency List

- Numbering format:
  Category
    Subcategory
      Competency (*9.03.12.00)
        Competency Builder (9.03.12.11)

- An asterisk (*) indicates that the statement is a competency. Others are competency builders. Competency statements always end with ".00" in the builder columns.

- Categories:
  1 = Communications Literacy ...... 47 competencies
  2 = Individual Development .... 11 competencies
  3 = Mathematics Literacy .... 30 competencies
  4 = Science Literacy .... 16 competencies
  5 = Social/Cultural Literacy .... 21 competencies
  6 = Technology Literacy .... 26 competencies
  151 total

- Professional Options (technical) competencies are not included. The set of specific technical competencies used will depend on the particular Tech Prep program model. These are contained in separate documents available from each school's representative to the Tech Prep Consortium Implementation Committee.

- Communications Literacy competencies do not include builders.

- Individual Development category does not include subcategories.

Acknowledgements

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COMMUNICATIONS LITERACY COMPETENCIES

Effective Reading Skills

*1.01.01.00 Differentiate between fact, opinion, and inference.

*1.01.02.00 Cite details that support or do not support predictions.

*1.01.03.00 Recognize the intent and use of propaganda.

*1.01.04.00 Identify and summarize ideas, information, and events that are explicitly stated in written material.

*1.01.05.00 Explain the sequence of time, places, events, and ideas.

*1.01.06.00 Identify and explain the main and subordinate ideas (stated or implied) in a written work.

*1.01.07.00 Apply interpretive level comprehension skills to generate ideas and/or hypotheses about the content.

*1.01.08.00 Find, understand, interpret, and apply information from a variety of sources (books, manuals, newspapers, periodicals, directories, reference works, computer printouts, and electronic sources).

*1.01.09.00 Use the features of books and reference materials, such as table of contents, preface, introduction, titles and subtitles, index, glossary, appendix, and bibliography.

*1.01.10.00 Define and use unfamiliar words and specialized vocabulary (including abbreviations, acronyms, concepts, and jargon) by using structural analysis, decoding, contextual cues, dictionaries, and computers.

*1.01.11.00 Read and understand short notes, memos, letters, and forms.

*1.01.12.00 Read and follow complex directions.

*1.01.13.00 Determine the author's purpose.

*1.01.14.00 Read, evaluate, and respond critically to various literature forms, genres, and printed media.

*1.01.15.00 Recognize and interpret organizational patterns of writing (e.g., cause and effect, comparison and contrast, and simple listing).

*1.01.16.00 Identify the structural elements of literature (e.g., plot, theme, character, mood, setting, and point of view).

*1.01.17.00 Identify literary devices (e.g., metaphor, foreshadowing, flashback, allusion, satire, and irony).

*1.01.18.00 Explore and analyze a variety of cultural elements, attitudes, beliefs, and value structures through reading.

Effective Speaking and Presentation Skills

*1.02.01.00 Give oral directions and clear explanations.

*1.02.02.00 Participate critically and constructively in the exchange of ideas, particularly during class discussions and conferences with individuals.

*1.02.03.00 Demonstrate correct usage of vocabulary.

*1.02.04.00 Demonstrate an awareness and understanding of interpersonal communication skills (verbal and nonverbal) in one-to-one and small group settings (role playing).

*1.02.05.00 Speak effectively using nonverbal communication such as eye contact, posture, and gestures.

*1.02.06.00 Select topics suitable to audience, situation, and purpose.

*1.02.07.00 Demonstrate effective speaking skills in seeking employment and in utilizing management skills on the job.

*1.02.08.00 Give formal and informal talks and speeches.

*1.02.09.00 Demonstrate the difference between informing and persuading and use the appropriate techniques of content and delivery for each purpose.

*1.02.10.00 Use visual media.

*1.02.11.00 Demonstrate proper telephone etiquette.

Effective Writing Skills

•1.03.01.00 Demonstrate ability to use different forms of writing (e.g., literary response, business and technical communicative modes, personal responses, journals, research and recording).

•1.03.02.00 Demonstrate appropriate selection of mode, purpose, audience, point of view, and organization of information in written assignments.

•1.03.03.00 Demonstrate expertise in word processing, graphics, and/or desktop publishing aids for writing.

•1.03.04.00 Apply writing process techniques: 1) Prewriting, 2) Drafting, 3) Revising, 4) Editing/proofreading, 5) Publishing.

•1.03.05.00 Demonstrate ability to evaluate written assignments using a diagnostic rubric.

•1.03.06.00 Develop and maintain a professional writing portfolio.

Listening Skills

•1.04.01.00 Follow spoken directions.

•1.04.02.00 Distinguish between fact and opinion.

•1.04.03.00 Make inferences and draw conclusions from verbal and nonverbal messages.

•1.04.04.00 Identify and comprehend the main-and subordinate ideas in lecture and discussions, questions to clarify information heard, and report accurately what others have said.

•1.04.05.00 Restate or paraphrase a conversation to confirm one's own understanding of what was said.

•1.04.06.00 Take accurate notes which summarize material presented from spoken conversations, including telephone messages.

•1.04.07.00 Recognize multi-cultural differences when listening.

Critical Viewing/Graphic/Observation Skills

•1.05.01.00	Read and understand graphs, charts, and tables to obtain factual information.
•1.05.02.00	Produce and utilize effective communication skills in the development of graphs, tables, and charts to communicate ideas.
•1.05.03.00	Critically view historical or contemporary events, via TV or video tape, and make appropriate observations.
•1.05.04.00	Analyze the effects of advertising and other visual media for direct and hidden messages, including propaganda devices.
•1.05.05.00	Communicate through use of video tape and computer presentations.

INDIVIDUAL DEVELOPMENT

•2.00.01.00 Apply critical thinking skills to personal, family, and work problems for the well-being of self and others

    2.00.01.01 Differentiate between facts and assumptions.

    2.00.01.02 Develop inferences from data.

    2.00.01.03 Demonstrate an ability to evaluate arguments.

    2.00.01.04 Utilize deductive logic by predicting specific phenomena from general statements.

•2.00.02.00 Apply problem-solving process to personal, family, and work-related problems for well-being of self and others

    2.00.02.01 Analyze and clarify own value structure.

    2.00.02.02 Evaluate the relationship between values and goals

    2.00.02.03 Establish priorities for short and long-term goals

    2.00.02.04 Describe the importance of flexibility when reevaluating goals

    2.00.02.05 Manage resources to achieve goals

    2.00.02.06 Identify adequate reliable information and resources for personal, family, and work-related problem solving.

    2.00.02.07 Create solutions to problems using technical means

    2.00.02.08 Compare and contrast the advantages and disadvantages of several solutions to a problem.

    2.00.02.09 Evaluate outcomes of a decision.

    2.00.02.10 Apply decision-making techniques in the workplace

    2.00.02.11 Apply technical problem solving abilities and creative talents to situations in the workplace

•2.00.03.00 Assume a leadership role as a responsible family member and citizen

2.00.03.01 Evaluate leadership styles appropriate for the workplace and/or home

2.00.03.02 Identify ways to be a responsible citizen at home, at school, at work, and in community settings

2.00.03.03 Develop effective communication skills.

2.00.03.04 Determine ways to motivate others

2.00.03.05 Demonstrate initiative to facilitate cooperation

•2.00.04.00 Build and maintain constructive interpersonal relationships

2.00.04.01 Assess and be sensitive to others' feelings and point of view

2.00.04.02 Examine how individuals from various backgrounds contribute to work and personal situations

2.00.04.03 Identify ways to work cooperatively with others of diverse background

2.00.04.04 Analyze strategies to manage conflict

2.00.04.05 Cooperate and compromise through teamwork and group participation

2.00.04.06 Develop communication patterns that enhance family relationships

2.00.04.07 Identify characteristics of love and commitment with family, friends, and others

2.00.04.08 Understand ways to build and maintain strong, functional families

2.00.04.09 Understand ways to build positive parent-child relationships

2.00.04.10 Enhance personal development of self and others throughout the lifespan

2.00.04.12 Develop a life-management plan

•2.00.05.00 Develop skills to successfully cope with changes taking place in society.

2.00.05.01 Analyze the effects of change

2.00.05.02 Identify strategies for dealing with family change and stress

2.00.05.03	Identify family and work support resources and services
2.00.05.04	Evaluate the need for continuing education and training
2.00.05.05	Implement strategies to manage the effects of stress
*2.00.06.00	Identify management strategies for balancing work and family roles and responsibilities
2.00.06.01	Analyze the effects of work on family
2.00.06.02	Analyze the effects of family on work
2.00.06.03	Describe personal and family roles and issues
2.00.06.04	Identify present and future family structures and responsibilities
2.00.06.05	Analyze concerns of working parent(s)
2.00.06.06	Evaluate importance of responsible parenting for individuals, families, and society
2.0.0.06.07	Coordinate personal and career responsibilities for well-being of self and others
*2.00.07.00	Develop strategies for lifelong career planning
2.00.07.01	Assess knowledge, attitudes, skills, and aspirations
2.00.07.02	Develop an awareness of careers and skills in a technological society.
2.00.07.03	Complete and process job application forms
2.00.07.04	Design a resume
2.00.07.05	Demonstrate interviewing skills
2.00.07.06	Compare and evaluate job opportunities
2.00.07.07	Analyze organizational structures of the workplace
2.00.07.08	Assess factors influencing wages, annual incomes, and job opportunities
2.00.07.09	Identify strategies for keeping a job, advancing in a job, and increasing wages

2.00.07.10 Evaluate factors involved when assuming a new position within or outside an occupation/ organization

2.00.07.11 Identify strategies for dealing with career successes, changes, and/or disappointments

2.00.07.12 State the approximate number of years a person can expect to work after leaving high school.
2.00.07.13 Compare the advantages and disadvantages of multiple incomes

2.00.07.14 Analyze opportunities for personal and career growth

2.00.07.15 Evaluate career choices in relation to life-management plan

2.00.07.16 Formulate plan to achieve career goals

•2.00.08.00 Develop habits and attitudes that reflect an appropriate work ethic.

2.00.08.01 Analyze the value of work ethic in relation to personal and family values and goals

2.00.08.02 Evaluate the relationship of self-esteem to work ethic

2.00.08.03 Follow directions.

2.00.08.04 Identify strategies to improve workplace policies and attitudes that support individuals and families.

2.00.08.05 Develop a positive attitude

2.00.08.06 Develop time management skills.

•2.00.09.00 Establish a plan for using resources to meet individual and family needs and goals

2.00.09.01 Analyze consumer rights and responsibilities

2.00.09.02 Make informed consumer choices for the well-being of self and others

2.00.09.03 Discuss the role of competitiveness in a global society.

2.00.09.04 Make decisions related to selecting, obtaining, and maintaining clothing for self and family

2.00.09.05 Evaluate financial institutions and services (e.g., savings, investments, credit).

2.00.09.06 Plan strategies to facilitate self-responsibility in managing a financial plan

*2.00.10.00 Evaluate entrepreneurship as a career option

2.00.10.01 Evaluate the role of small business in the economy

2.00.10.02 Analyze opportunities for new business.

2.00.10.03 Examine considerations of starting a business

2.00.10.04 Analyze responsibilities involved in managing a business .

2.00.10.05 Examine factors involved in obtaining financing.

2.00.10.06 Examine importance of effective record keeping.

2.00.10.07 Examine factors involved in selecting a business location.

2.00.10.08 Analyze importance of a customer service policy.

2.00.10.09 Analyze how laws affect small business operations.

2.00.10.10 Examine components of a marketing plan.

2.00.10.11 Analyze importance of a business plan.

*2.00.11.00 Make choices that promote wellness and good health for self and others

2.00.11.01 Describe the significance of a healthy lifestyle

2.00.11.02 Analyze interrelationship between food choices and wellness

2.00.11.03 Identify strategies to promote optimal nutrition and wellness of individuals and families

2.00.11.04 Prepare and serve nutritious foods

2.00.11.05 Demonstrate proper use of equipment

2.00.11.06 Maintain safe work and home environment

2.00.11.07 Identify substance use, abuse, and its effects on individuals, families, work and society.

2.00.11.08 Enhance self-esteem of self and others

2.00.11.09 Distinguish between responsible and irresponsible ways to express emotional and physical intimacy

2.00.11.10 Examine the role of the arts in cultural expression and identity.

2.00.11.11 Explore the significance of a variety of art forms.

MATHEMATICS LITERACY

Algebra

*3.01.01.00 Solve linear equations.

3.01.01.01 Combine like terms.

3.01.01.02 Use the Distributive Property to remove grouping symbols and the Addition/Subtraction Property to combine like terms to simplify expressions.

3.01.01.03 Solve equation in one variable utilizing one operation.

3.01.01.04 Solve equations in one variable utilizing two or more operations.

3.01.01.05 Describe and use the logic of equivalence in working with equations, inequalities, and functions.

3.01.01.06 Identify variables, constants, terms, e expressions, and coefficients.

3.01.01.07 Define absolute value.

3.01.01.08 Evaluate algebraic expressions.

3.01.01.09 Solve the literal equation or formula for a specified variable.

3.01.01.10 Recognize the properties of equalities.

3.01.01.11 Solve a 2x2 system of linear equations by elimination.

3.01.01.12 Solve a 2x2 system of linear equations by substitution.

3.01.01.13 Apply the rules for solving linear equations in one variable.

3.01.01.14 Use formulas.

3.01.01.15 Use handheld graphic calculators to solve linear equations and graph simple functions.

3.01.01.16 Solve linear equations in one variable containing an absolute value symbol.

*3.01.02.00 Use properties of exponents.

- 3.01.02.01 Define exponent.
- 3.01.02.02 Compare and compute using scientific notation.
- 3.01.02.03 Determine values for the square root of any natural number.
- 3.01.02.04 Determine the principal square root and recognize square roots of negatives as being non-real.
- 3.01.02.05 Divide terms having factors with exponents.
- 3.01.02.06 Multiply and divide polynomial expressions.
- 3.01.02.07 Operate with radicals and leave the result in simplified form.
- 3.01.02.08 Apply the properties of exponents to simplify polynomial expressions.
- 3.01.02.09 Multiply terms having factors with exponents.
- 3.01.02.10 Solve radical equations.

*3.01.03.00 Factor a polynomial of two or more terms.

- 3.01.03.01 Apply the distributive law in removing common factors.
- 3.01.03.02 Factor difference of two squares.
- 3.01.03.03 Factor quadratic trinomials.
- 3.01.03.04 Factor the sum and differences of perfect cubes.

*3.01.04.00 Solve linear inequalities and show the solution on a number line.

- 3.01.04.01 Combine like terms.
- 3.01.04.02 Use the Substitution Property to evaluate expressions and formulas.
- 3.01.04.03 Evaluate algebraic expressions.
- 3.01.04.04 Use the Distributive Property to remove grouping symbols and the Addition/Subtraction Property to combine like terms to simplify expressions.

3.01.04.05 Identify variables, constants, terms, expressions, and coefficients.

3.01.04.06 Solve equations in one variable utilizing two or more operations.

3.01.04.07 Describe and use the logic of equivalence in working with equations, inequalities, and functions.

3.01.04.08 Solve a linear inequality in one variable using two or more operations.

3.01.04.09 Define absolute value.

3.01.04.10 Solve problems involving statements of inequality.

*3.01.05.00 Recognize, relate, and use the equivalent ideas of zeros of a function, roots of an equation, and solution of an equation in terms of graphical and symbolic representations.

3.01.05.01 Apply the distributive law in removing common factors.

3.01.05.02 Factor the difference of two squares.

3.01.05.03 Factor quadratic trinomials.

3.01.05.04 Combine like terms.

3.01.05.05 Use the Distributive Property to remove grouping symbols and the Addition/Subtraction Property to combine like terms to simplify expressions.

3.01.05.06 Solve equation in one variable utilizing one operation.

3.01.05.07 Solve equations in one variable utilizing two or more operations.

3.01.05.08 Describe and use the logic of equivalence in working with equations, inequalities, and functions.

3.01.05.09 Identify variables, constants, terms, expressions, and coefficients.

3.01.05.10 Explore and describe characterizing features of functions.

3.01.05.11 Find X and Y intercepts of a line.

3.01.05.12 Decide whether or not a relation is a function. Use function notation. Find domains and ranges.

- •3.01.06.00 Graph equations.
  - 3.01.06.01 Develop graphical techniques of solution for problem situations involving functions
  - 3.01.06.02 Explore and describe characterizing features of functions.
  - 3.01.06.03 Describe problem situations by using and relating numerical, symbolic, and graphical representations
  - 3.01.06.04 Use the language and notation of functions in symbolic and graphing settings.
  - 3.01.06.05 Find X and Y intercepts of a line.
  - 3.01.06.06 Write equations for a line.
  - 3.01.06.07 Use a graphing calculator or computer to generate the graph of EL function.
  - 3.01.06.08 Graph a linear equation using the slope-intercept method.
  - 3.01.06.09 Translate among tables, algebraic expressions, and graphs of functions
  - 3.01.06.10 Estimate shape of graphs of various functions and algebraic expressions.
  - 3.01.06.11 Use handheld graphic calculators to solve linear equations and graph simple functions.
  - 3.01.06.12 Graph basic functions using Cartesian coordinate system.
- •3.01.07.00 Demonstrate the ability to translate statements and equations from written to algebraic form and algebraic to written form.
- •3.01.08.00 Determine slope midpoint, and distance.
  - 3.01.08.01 Solve problems related to sets of points on a Cartesian coordinate system.
- •3.01.09.00 Model real-world phenomena with polynomial and exponential functions.
  - 3.01.09.01 Use curve fitting to predict from data.

Geometry

(Note: It is appropriate to teach geometry to Tech Prep students with some theorems and proofs, but for maximum student engagement and success, the major focus should be on the more practical aspects of geometry, such as calculating volumes, surfaces, etc.)

*3.02.01.00 Find perimeters, surface areas and volumes of geometric figures.

- 3.02.01.01 Recognize and classify two- and three-dimensional figures (e.g., circles, triangles, rectangles, cylinders, prism).
- 3.02.01.02 Create and interpret drawings of three-dimensional objects.
- 3.02.01.03 Classify, label, and describe polygons and solids.
- 3.02.01.04 Represent problem situations with geometric models and apply properties of figures.
- 3.02.01.05 Use handheld graphic calculators to solve area and volume problems.
- 3.02.01.06 Given the linear dimensions of various geometric shapes common to the techno-- logical industries, determine areas and volumes in English and metric units.

*3.02.02.00 Explore compass and straight edge constructions in the context of geometric theorems.

*3.02.03.00 Recognize, classify, and use properties of lines and angles.

- 3.02.03.01 Demonstrate an understanding of angles and parallel and perpendicular lines.
- 3.02.03.02 Define terms related to angles.
- 3.02.03.03 Make constructions related to angles.
- 3.02.03.04 Demonstrate an understanding of special angles.
- 3.02.03.05 Understand the various units of measure of angles.
- 3.02.03.06 Identify points, lines, and planes.
- 3.02.03.07 Use the concept of between-ness.
- 3.02.03.08 Measure angles correctly.

*3.02.04.00 Describe and apply the properties of similar and/or congruent figures.

  3.02.04.01 Be able to make scale drawings.

*3.02.05.00 Solve right-triangle problems.

  3.02.05.01 Apply the Pythagorean theorem.

  3.02.05.02 Identify basic functions of sine, cosine, and tangent

  3.02.05.03 Compute and solve problems using basic trig functions.

*3.02.06.00 Demonstrate inductive and deductive reasoning through application to various subject areas.

  3.02.06.01 Demonstrate an understanding of and ability to use proof.

Numbers and Number Relations

*3.03.01.00 Estimate answers, compute, and solve problems involving real numbers.

  3.03.01.01 Round off decimals to one or more places

  3.03.01.02 Round and/or truncate numbers to designated place value.

  3.03.01.03 Round off single and multiple digit whole numbers.

  3.03.01.04 Estimate measurements.

  3.03.01.05 Use mental computation when computer and calculator are inappropriate.

*3.03.02.00 Compare and contrast the real number system, the rational number system' and the whole number system.

*3.03.03.00 Determine if a solution to a mathematical problem is reasonable (estimate).

*3.03.04.00 Select and compute using appropriate units of measure.

  3.03.04.01 Convert, compare, and compute with common units of measurement within and/or across measurement systems.

Data Analysis and Probability

*3.04.01.00 Collect and organize data into tables, charts, and graphs.

  3.04.01.01 Take a random sample from a population.

*3.04.02.00 Determine the probability of an event.

  3.04.02.01 Determine the probability of more than one event.

  3.04.02.02 Use computer simulations and random number generation to estimate probability.

*3.04.03.00 Understand and apply measures of central tendency, variability, and correlation.

  3.04.03.01 Compute and interpret means (averages).

  3.04.03.02 Compute and interpret median and/or mode.

  3.04.03.03 Understand what a normal distribution is.

  3.04.03.04 Understand what a uniform distribution is.

Technical Algebra

*3.05.01.00 Evaluate and graph functions using rectangular coordinates.

  3.05.01.01 Graph inequalities in two variables.

  3.05.01.02 Analyze the effects of parameter changes on graphs.

*3.05.02.00 Solve systems of linear equations and inequalities using matrices, graphs, and algebraic methods.

  3.05.02.01 Solve systems of linear equations with up to three variables.

  3.05.02.02 Solve a 2x2 system of linear equations using matrices.

  3.05.02.03 Describe and solve algebraic situations with matrices.

•3.05.03.00 Understand the complex number system and exhibit facility with its operation.

3.05.03.01 Solve problems having complex solutions.

3.05.03.02 Examine complex numbers as zeros of functions.

3.05.03.03 Graph basic functions using polar coordinate system.

3.05.03.04 Graph using polar coordinates.

3.05.03.05 Contrast and compare algebras of rational, real, and complex numbers with characteristics of a matrix algebra system.

3.05.03.06 Determine factors and roots of a polynomial with complex roots.

3.05.03.07 Graph complex numbers.

3.05.03.08 Add, subtract, multiply and divide complex numbers in rectangular and polar form.

3.05.03.09 Convert complex numbers from rectangular form to the exponential.

•3.05.04.00 Analyze exponential and logarithmic functions.

3.05.04.01 Identify and define inverse functions.

3.05.04.02 Do calculations involving exponential and logarithmic expressions and functions.

3.05.04.03 Use definitions to show the relationship between exponential and logarithmic functions.

3.05.04.04 Graph the logarithmic and exponential functions.

3.05.04.05 Describe and use inverse relationship between functions including exponential and logarithmic.

3.05.04.06 Use graphing calculators to generate tables to plot exponential and logarithmic curves.

3.05.04.07 Use properties of logarithms to solve problems.

3.05.04.08 Use graphing calculators to calculate logarithms in bases other than 10.

3.05.04.09 Solve elementary logarithmic and exponential equations.

•3.05.05.00 Simplify and solve quadratic equations.

3.05.05.01 Simplify algebraic expressions and multiply and divide polynomials along with solving quadratic equations.

3.05.05.02 Solve a quadratic equation by factoring by completing the square, and by using the quadratic formula.

Technical Trigonometry

•3.06.01.00 Solve problems using the trigonometric functions.

3.06.01.01 Know the sign of each circular function in any quadrant.

3.06.01.02 Know the circular functions of the special angles, pi/6, pi/4, pi/3 (30, 60, 90)

3.06.01.03 Define the circular functions on a circle of radius r with the center at the origin.

3.06.01.04 Understand the relationship of the circular functions and the trig functions.

3.06.01.05 Identify and use the trig functions for the sum of angles.

3.06.01.06 Solve right-triangle problems.

3.06.01.07 State the value of the trig functions of an angle using the reference angle.

3.06.01.08 Apply the law of sines to find measures of sides of angles of a triangle.

3.06.01.09 Apply the law of cosines in finding measures of sides and angles of triangles.

3.06.01.10 Convert between radians and degrees.

3.06.01.11 Solve problems with negative rotations.

3.06.01.12 Solve right triangle problems including application problems.

•3.06.02.00 Recognize and identify graphs of the trigonometric functions.

- 3.06.02.01 Recognize and graph basic trig curves.
- 3.06.02.02 Explore graphs in three dimensions.
- 3.06.02.03 Identify and define inverse functions.
- 3.06.02.04 Solve trigonometric equations and verify trigonometric identities.
- 3.06.02.05 Use the fundamental trig identities in performing operations.

•3.06.03.00 Demonstrate an understanding in the use of vectors.

- 3.06.03.01 Apply vectors in problem solutions
- 3.06.03.02 Deduce properties of figures using vectors.
- 3.06.03.03 Develop and use vectors to represent distance and magnitude including operations.
- 3.06.03.04 Explore relationships between complex numbers and vectors.
- 3.06.03.05 Add and subtract vectors geometrically.
- 3.06.03.06 Use graphing calculators in the study of vectors.

SCIENCE LITERACY

Chemistry

*4.01.01.00 Explore atomic theory and present findings using various representational formats.

- 4.01.01.01 Describe a mechanism of bond formation and identify the type of chemical bond formed as ionic, covalent, or metallic.
- 4.01.01.02 Relate the concept of periodicity to atomic properties and the periodic table of elements.
- 4.01.01.03 Describe charge and ionic compounds in the context of electrochemical theories.
- 4.01.01.04 Recognize that the atomic model is only a model and, like any model, is subject to change.
- 4.01.01.05 State an atomic theory which includes atomic structure, components and their properties, interactions (electron/nuclear) and theory models.
- 4.01.01.06 Demonstrate knowledge of chemical symbolism which will include symbols, formulas, and equations.

*4.01.02.00 Perform investigations that require observations over varying periods of time concerning the interrelationship of matter and energy.

- 4.01.02.01 State a scheme of matter which includes elements, compounds, and mixtures.
- 4.01.02.02 Relate a chemical equation to the concept of chemical change.
- 4.01.02.03 Classify matter according to properties and composition.
- 4.01.02.04 Predict the properties of matter based on data provided in pictures, drawings, charts, graphs, tables, mathematical expressions, and scientific literature.
- 4.01.02.05 Describe the conservation laws and correctly use the standard units for these laws in relation to conservation of mass/energy and conservation of charge.
- 4.01.02.06 Describe properties of carbon and organic molecules.

4.01.02.07 State the laws of chemical combinations (conservation of mass, definite composition, multiple proportions).

4.01.02.08 List assumptions of the kinetic theory of matter.

4.01.02.09 Understand chemical changes during combustion, and the relationship between these changes and the carbon cycle, and relationship to the greenhouse effect.

4.01.02.10 Manipulate data in problem solving, including: mole problems, concentration problems, gas law problems, atomic/molecular structure problems and equation balancing.

4.01.02.11 Discuss the concept of mole.

4.01.02.12 State the properties of gases and the laws that apply to gases.

4.01.02.13 Identify applications of Avogadro's hypothesis such as Avogadro's number, molar volume, and gram molecular weight/molar mass.

4.01.02.14 Use the kinetic molecular theory to explain states of matter, rates of reaction, and chemical equilibrium.

4.01.02.15 Describe Stoichiometric relationships

Biology/Ecology

*4.02.01.00 Using models and explorations, examine cellar components and their relationships.

4.02.01.01 Describe the cell theory; structure and function.

4.02.01.02 Describe the role of nucleic acids in cell functions and heredity.

4.02.01.03 Describe the events of mitosis and meiosis.

4.02.01.04 State Mendel's laws of heredity.

4.02.01.05 List causes and effects of gene mutations and chromosomal aberrations.

4.02.01.06 Describe current advances in genetic engineering and possible applications in agriculture and medicine.

•4.02.02.00 Recognizing and contrasting biological characteristics, derive a scheme to classify living organisms.

- 4.02.02.01 List characteristics of living organisms.
- 4.02.02.02 Classify common organisms by observable characteristics.
- 4.02.02.03 Describe how living organisms are classified.
- 4.02.02.04 List characteristics of organisms in each kingdom.
- 4.02.02.05 Explain the difference between viruses and bacteria.

•4.02.03.00 Formulate an understanding of the relationship about organisms, their physical surroundings and their change processes.

- 4.02.03.01 Describe the interrelationship of an organism with its environment, including: pollution, populations, community, conservation, habitat, and ecosystem.
- 4.02.03.02 Define natural selection and list evidence for its existence.
- 4.02.03.03 Discuss the development of Darwin's theory of evolution.
- 4.02.03.04 Discuss hypotheses of the origin of life.
- 4.02.03.05 Identify ways to take responsibility for living in a global environment
- 4.02.03.06 Explain and present examples of the importance of water to sustain life in terms of available water sources, water quality, and uses and quantification.
- 4.02.03.07 Explain interrelationship of wastewater collection, treatment, and public health in terms of organic and inorganic pollutant concentrations and pathogenic organisms.
- 4.02.03.08 Describe how human activities interfere with biological diversity.

•4.02.04.00 Using an understanding of life processes, formulate explanations of the influences and the effects of other organisms on the living condition.

- 4.02.04.01 Explain the relationship between microorganisms and disease .

4.02.04.02 Describe the following life processes: digestion, transpiration, respiration, circulation, reproduction, locomotion, excretion, sensory, regulation by endocrine glands, metabolism, and photosynthesis

4.02.04.03 Distinguish between myths and realities of the HIV virus and AIDS.

4.02.04.04 Explain the relationship between anatomical structure and function.

4.02.04.05 Identify structures in human physiology

Physics

•4.03.01.00 Analyze changes within a system when inputs, outputs, and interactions are altered to explain the behavior of charges.

4.03.01.01 Describe electrical energy, including the interaction of matter and energy and energy transformation.

4.03.01.02 Describe the properties of magnetic fields, electrical fields, and electrical charges.

4.03.01.03 Identify and describe basic electrical systems components and theories.

•4.03.02.00 Using measuring and mathematical techniques, apply the laws of motion and conservation to real physical systems.

4.03.02.01 Describe energy transfers and transformations of a system utilizing conservation laws.

4.03.02.02 Describe motion in the context of Newton's Law: linear and rotational.

4.03.02.03 Define work and energy and relate these concepts to kinetic energy, potential energy, and conservation of energy.

4.03.02.04 Define temperature and heat in units commonly used for each.

4.03.02.05 Identify the causes and effects of motion.

4.03.02.06 Use vector analysis (mathematical and graphical) to represent and solve force system problems.

*4.03.03.00 Analyze the heat energy changes within a system as related to the laws of thermodynamics.

4.03.03.01 State first and second laws of thermodynamics.

4.03.03.02 Define specific heat capacity and latent heat.

4.03.03.03 Discuss the concept of entropy.

*4.03.04.00 Using the knowledge gained through experimentation of the characteristics of waves, predict how waves will behave as they interact with each other and various materials.

4.03.04.01 Describe sound systems, including the interaction of matter and energy and energy transformation.

4.03.04.02 Identify the general areas of the electromagnet ice spectrum.

4.03.04.03 Describe reflection and refraction as applied to mirrors and optical instruments (lenses).

4.03.04.04 Describe the particle and wave theories of light.

Laboratory Safety Procedures

*4.04.01.00 Identify and be able to manipulate lab apparatus and materials safely.

*4.04.02.00 Demonstrate familiarity with lab safety equipment (e.g., eyewash, fire blanket & extinguisher, shower, etc.).

Scientific Process

*4.05.01.00 Using sound experimental designs, formulate hypotheses and models that account for observable events.

4.05.01.01 Describe the role of observation and experimentation in the development of scientific theories.

4.05.01.02 Describe the importance of the use of models in scientific thought.

4.05.01.03 Recognize that scientific models are only representations of phenomena and may in fact be faulty or deficient.

4.05.01.04 Investigate some of the ethical dilemmas of the scientist.

4.05.01.05 Identify and define a scientific problem.

4.05.01.06 Ask appropriate scientific questions and recognize what is involved in experimental approaches to the solutions of such questions through familiarity with laboratory and field work.

4.05.01.07 Identify problems rooted in science and technology (effects of hazardous materials on health and safety, effects of drugs on health, troubleshooting problems on a machine).

•4.05.02.00 Use sound experimental designs and models to test hypotheses.

4.05.02.01 Distinguish among fact, hypothesis, and opinion; the relevant from the irrelevant; and the model from the observations the model was derived to describe.

4.05.02.02 Check the logical consistency of hypothesis with relevant laws, facts, observations, or experiments.

4.05.02.03 Read scientific materials critically.

4.05.02.04 Gather scientific information through library work.

4.05.02.05 Investigate areas of specialization in science.

4.05.02.06 Apply basic scientific/technical solutions to selected problems.

4.05.02.07 Employ scientific laws and principles in familiar or unfamiliar situations.

4.05.02.08 Make predictions from data using concepts, laws, and theories.

4.05.02.09 Use facts, concepts, laws, and theories to explain phenomena.

4.05.02.10 Predict the effects of changing variables in a given situation.

4.05.02.11 Suggest or recognize a scientific hypothesis.

4.05.02.12 Construct a hypothetical model.

4.05.02.13 Make direct measurements using laboratory apparatus.

4.05.02.14 Design, conduct, and evaluate an experiment.

4.05.02.15 Use sampling techniques.

4.05.02.16 Propose or select validating procedures (both logical and empirical).

4.05.02.17 Analyze experimental designs.

4.05.02.18 Demonstrate concern for issues related to measurement (e.g., reliability and validity).

*4.05.03.00 Using observations derived from experimental data, draw conclusions or make inferences.

4.05.03.01 Interpret data; i.e., comprehend the meaning of data and recognize, formulate, and evaluate conclusions and generalizations on the basis of information known or given.

4.05.03.02 Interpret information presented in pictures, drawings, charts, graphs, mathematical expressions, and scientific literature.

4.05.03.03 Reason quantitatively and symbolically.

4.05.03.04 Interpret observations of experiments and analyze these to determine patterns, state inferences, and/or draw conclusions.

4.05.03.05 Interpret experimental observations using facts, concepts, laws, and theories.

*4.05.04.00 Organize and communicate the results obtained by observation and experimentation.

4.05.04.01 Sequence events according to the order of occurrence.

4.05.04.02 Describe ways scientists communicate their results.

4.05.04.03 Demonstrate the ability to summarize empirical findings clearly and concisely in written form.

SOCIAL/CULTURAL LITERACY

Growth of Social Political, and Economic Institutions

*5.01.01.00 Describe the role of individuals within their political system, process of voter registration, the election process and responsibility and privileges of citizenship and how law protects individuals.

*5.01.02.00 Explain reasons for European settlement in the New World, the development of divergent political ideology and development of a new nation.

*5.01.03.00 Examine important historical documents in context with the American experience including socio-political and ideological influences that shaped their design. (NW Ordinance, Declaration of Independence, Bill of Rights, and Constitution)

  5.01.03.01 Explain the purpose and contents of the Bill of Rights.

  5.01.03.02 Demonstrate an understanding of federalism (local, state, national).

  5.01.03.03 Identify the main function of each branch (legislative, executive, judicial) at different levels.

  5.01.03.04 Describe the process for making, amending or removing laws.

  5.01.03.05 Identify representative symbols: flag, national anthem, Pledge of Allegiance, Independence Day, etc.

*5.01.04.00 Describe the political process.

  5.01.04.01 Understand the role of political parties in a democracy.

  5.01.04.02 Understand the role of public officials and how policy is carried out.

  5.01.04.03 Describe strengths and weaknesses of the American System.

  5.01.04.04 Describe how resources are gathered to support the process and policies.

*5.01.05.00 Compare and contrast political systems.

  5.01.05.01 Distinguish characteristics and essential features of representative democracy, monarchy, and dictatorships.

5.01.05.02 Identify international governing bodies (e.g., United Nations, League of Nations, World Bank, European Economic Community, Organization of American States, etc.) and their impact.

*5.01.06.00 Compare the culture, customs, and traditions of different ethnic and minority groups in America.

5.01.06.01 Be aware of the diverse social, psychological, political, and economic factors which influence lifestyles.

5.01.06.02 Evaluate methods and procedures applied by individuals, groups and social agencies to overcome social and economic barriers.

5.01.06.03 Determine the role of, and conflict between, American values such as order, freedom, equality and individualism as they operate in the American Political System.

5.01.06.04 Assess the impact of social class and social structure on economic development in specific countries in the First World and in the Third World.

*5.01.07.00 Know that individuals and societies make choices to satisfy wants with limited resources.

5.01.07.01 Develop an understanding of economic systems.

5.01.07.02 Develop an understanding of the structure and functions of the American economy.

5.01.07.03 Recognize the uneven distribution of world resources.

5.01.07.04 Describe the role of technological growth in economic development and the impact of technology on the physical and human environment.

Human Diversity and Historical/Current Issues

*5.02.01.00 Describe the causes and effects of selected wars.

*5.02.02.00 Describe the diversity of populations encompassing the Civil Rights movement, racism, ethnocentrism, and minority group movements.

5.02.02.01 Recognize diversity among significant individuals

5.02.02.02 Recognize diversity among significant organizations

5.02.02.03 Recognize diversity surrounding immigration

5.02.02.04 Recognize diverse ethnic and minority groups

5.02.02.05 Recognize major world religions

5.02.02.06 Describe the relationship between diversity and historical development and contributions

*5.02.03.00 Describe how an individual interacts with the various societal, economic, and political systems.

5.02.03.01 Be aware of the diverse social, psychological, political and economic factors which influence lifestyles.

5.02.03.02 Recognize individuals and societal practices which result in exceptional treatment of people from various backgrounds.

5.02.03.03 Identify and define the basic concepts of community and community development, and the role of individuals within their political systems and opportunities for civic involvement.

5.02.03.04 Describe and discuss contemporary domestic and international political issues and events, and evaluate the way they impact on self and society.

5.02.03.05 Identify and discuss career opportunities.

Analyzing Information

*5.03.01.00 Differentiate between primary and secondary sources of information.

*5.03.02.00 Illustrate that information can be influenced by cultural bias or propaganda.

*5.03.03.00 Analyze and explain social, cultural and political problems and suggest remedies to those problems.

*5.03.04.00 Compare and contrast culture, customs and traditions of ethnic and minority groups.

*5.03.05.00 Analyze social forces that influence family life.

*5.03.06.00 Demonstrate the ability to use information that enables citizens to make informed choices.

*5.03.07.00	Communicate and cooperate with people of different cultural backgrounds.
*5.03.08.00	Collect and analyze information from charts, graphs, maps, and pictures.
*5.03.09.00	Identify and explain how world problems and future trends will impact his or her life.
*5.03.10.00	Describe and discuss world patterns of population, geographic landforms, climate regions, and economic activities.
*5.03.11.00	Identify opportunities for involvement in civic activities.

TECHNOLOGY LITERACY

Impact of Technology

*6.01.01.00 Develop an awareness of the need and function of technology in society.

- 6.01.01.01 Explore cause and effect linkages between technology and the environment.
- 6.01.01.02 Explain how technological change can affect all technology.
- 6.01.01.03 Evaluate the impact of technology on people, the environment, culture, the economy, and community.
- 6.01.01.04 Explain how business and industry are related to the larger context of technology, industry, and society.
- 6.01.01.05 Describe the way in which technological systems have affected social changes and patterns in our society.
- 6.01.01.06 Explore how people use technology to solve problems.

*6.01.02.00 Develop an awareness of the significance of technology in the past, present, and future.

*6.01.03.00 Explain the interrelationships between business, industry, and society.

- 6.01.03.01 Evaluate the impact of infrastructure deterioration on people, the environment, and the economy.

*6.01.04.00 Analyze the role of ethics in technological decision making.

- 6.01.04.01 Research the social effects of technology and identify ethical implications that develop.
- 6.01.04.02 Recognize that all technological endeavors yield positive and negative side effects.
- 6.01.04.03 Describe the impact of government on the use of technology.
- 6.01.04.04 Describe copyright laws and issues as they apply to software.
- 6.01.04.05 Describe security/privacy issues related to the use of computers.

*6.01.05.00 Explain the interrelationship between business, industry, and community.

Technology in the Workplace

*6.02.01.00 Describe the importance of product quality control.

6.02.01.01 Participate in project-oriented quality control exercises.

*6.02.02.00 Describe the importance of the quality control process.

6.02.02.01 Explain how improved quality leads to improved productivity, competitive position, and profitability.

6.02.02.02 Define the principles of team management.

6.02.02.03 Describe the importance of statistical process control.

6.02.02.04 Plan team meetings.

6.02.02.05 Cite examples of companies that have benefitted from quality efforts.

*6.02.03.00 Solve problems utilizing a systems approach.

6.02.03.01 Apply brainstorming as a method for generating ideas.

6.02.03.02 Apply cause and effect analysis.

6.02.03.03 Evaluate results and make modification to improve a solution.

6.02.03.04 Compile and analyze experimental or design data.

6.02.03.05 Seek new knowledge, synthesize this information, and formulate it into a report or use it in solving a defined problem.

6.02.03.06 Use a research and development process common to industry to solve problems (integrating a variety of productivity analysis skills).

6.02.03.07 Learn how to reach a group consensus.

6.02.03.08 Distinguish between open and closed loop systems.

*6.02.04.00 Define productivity and its relationship to management concepts.

6.02.04.01 Develop an action plan that details what, when, and by whom, action will be taken for performance improvement.

6.02.04.02 Demonstrate the ability to apply management and planning tools such as flow charts, check sheets, cause and effect diagrams, control charts, etc.

6.02.04.03 Describe and use the Plan-Do-Check-Act process.

6.02.04.04 Describe input, process, output systems.

*6.02.05.00 Given an industry or a company, identify "customers."

*6.02.06.00 Develop the ability to function as a member of small or large groups.

6.02.06.01 Learn how to reach a group consensus.

6.02.06.02 Participate in at least one decision-making responsibility role of a hypothetical enterprise.

6.02.06.03 Demonstrate effective negotiation skills.

6.02.06.04 Demonstrate effective delegation skills.

6.02.06.05 Describe the purpose of unions.

*6.02.07.00 Describe the free enterprise system.

6.02.07.01 Describe a simplified version of a patent application process to ensure protection of ideas and control of disclosure.

Technological Tools and Techniques

*6.03.01.00 Describe basic computer operations.

*6.03.02.00 Operate computer hardware.

6.03.02.01 Demonstrate keyboarding proficiency.

6.03.02.02 Demonstrate the ability to utilize various peripherals.

6.03.02.03 Access information networks of a variety of types.

6.03.02.04 Identify and describe the function of the major hardware components comprising a personal computer.

*6.03.03.00 Utilize a variety of software.

6.03.03.01 Prepare reports, resumes, or memoranda using a word processing package.

6.03.03.02 Describe what a database is and what it is used for.

6.03.03.03 Demonstrate general knowledge of CAD and CAM technologies.

6.03.03.04 Describe the major types and applications of software.

6.03.03.05 Determine the availability of resources through information networks.

6.03.03.06 Operate desktop publishing systems.

6.03.03.07 Access external computers using a modem.

6.03.03.08 Utilize information management systems.

6.03.03.09 Utilize a spreadsheet package.

6.03.03.10 Apply basic commands to format disks, copy files, create directories, delete files, change default drives, and access software packages for a variety of computer systems.

*6.03.04.00 Use basic technological language accurately across a variety of technologies.

6.03.04.01 Demonstrate familiarity with different types of language forms used in various technologies, i.e., graphic, symbolic, and verbal.

6.03.04.02 Recognize that different technologies use jargon specific to those technologies.

6.03.04.03 Describe the resources necessary for technology resource people: i.e., information, materials, tools/machines, capital, energy, and time.

*6.03.05.00 Visualize and describe two- and three-dimensional space.

6.03.05.01 Demonstrate familiarity with the basic types of engineering drawings.

6.03.05.02 Illustrate and/or describe 3-D objects from different points of view (front, back, side, etc.)

6.03.05.03 Develop a three-dimensional mental and physical representation of an object from a two-dimensional drawing.

6.03.05.04 Visualize and present product ideas

*6.03.06.00 Utilize two- and three-dimensional drawings.

6.03.06.01 Represent a three-dimensional object in a two-dimensional drawing.

6.03.06.02 Refine and communicate project ideas.

*6.03.07.00 Create a three-dimensional drawing.

*6.03.08.00 Develop responsible attitudes toward safety around technology.

6.03.08.01 Demonstrate the safe and correct handling of hazardous materials and processes.

6.03.08.02 Demonstrate proper use of common hand and power tools.

*6.03.09.00 Use measuring devices.

6.03.09.01 Perform linear measuring procedures.

6.03.09.02 Perform volume measuring procedures.

6.03.09.03 Demonstrate the accurate use of architectural and engineering scales.

6.03.09.04 Perform temperature measuring procedures.

*6.03.10.00 Demonstrate factors affecting the selection and use of material resources.

6.03.10.01 Explore the utilization of tools and materials in engineering applications.

6.03.10.02 Describe the major properties of materials.

6.03.10.03 Safely perform some common secondary materials processing activities (e.g., drilling, milling, turning, and grinding).

*6.03.11.00 Choose appropriate resources.

6.03.11.01 Perform selected tests to determine materials properties and appropriateness for various uses.

*6.03.12.00 Use multimedia equipment.

6.03.12.01 Create multimedia presentations.

*6.03.13.00 Demonstrate an understanding of the roles and importance of electronics in contemporary technology

6.03.13.01 Describe what is meant by electronics technology.

6.03.13.02 List where electronics technology is used.

6.03.13.03 Describe why electronics technology is used.

HEART of OHIO TECH PREP CONSORTIUM

1997

Engineering Technologies Core Model

PART III:
Tech Prep Secondary Competencies (Leveled)

Course of Study for

Tech Prep Engineering Technologies

Westerville Schools
Westerville, Ohio

Dr. Ernest A. Husarik
Superintendent of Schools

Dr. Michael L. Kabler
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Supervisor of Vocational/Career Education and Staff Development

1998

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Statement of Approval*

The Westerville Board of Education Officially Adopted

The Engineering Technologies Course of Study

On

DATE

*Section 3313.60 of the Ohio Revised Code requires a board of education to prescribe a graded course of study for all schools under their control. The mandate applies to boards of education of all county, exempted village and city school districts. State minimum school standards, which have the effect of law, extend the mandate to the corresponding authority in non-tax-supported schools or school systems.

Westerville Board of Education

Jeffrey Copeland, President
Debbie Cunningham, Vice President
Rick Bannister, Member
Nur Hussen, Member
Nancy Nestor-Baker, Member

Westerville Schools Philosophy and Goals

The Westerville City Schools Board of Education believes it should provide all students maximum educational opportunities within the constraints of available facilities, financial resources, legal requirements and citizen involvement. It is the board's responsibility to encourage the development of each student's ability to contribute in a democratic, free enterprise and technological society. To this end, the board believes that the basic purposes of the public schools are to:

1. Help each student grow in the knowledge and acceptance of self by providing each student

    - opportunity to grow as an individual,
    - opportunity to realize his or her potential, find his or her talents, and expand those talents, recognition as a unique being with special abilities.

2. Help each student develop an appreciation for personal worth and to develop individual talent and ability by promoting

    - fundamental knowledge and skills necessary for jobs and careers,
    - desire and ability to continue the learning process throughout one's life
    - exposure to the excitement and enjoyment of learning by acquiring knowledge, developing methods for gathering information, and obtaining essential skills and techniques to help in decision making and life-long learning.

3. Help each student develop the knowledge and ability to share his or her talents with others by encouraging each to develop

    - self respect and self worth in order to relate to oneself and others,
    - a sense of involvement in the school community, an understanding of personal interest and individual goals,
    - preparation for
        - creative and critical thinking
        - responsibility as a citizen of our country
        - expressing view points and convictions
        - flexibility to adapt and change to productively meet the demands of society

Tech Prep

Another way to go to college

Tech Prep Program Philosophy

The Tech Prep program for Westerville City Schools is designed to meet the needs of the students who have traditionally participated in a segmented and often unfocused course of study (general education). With the Tech Prep emphasis on the integration of college prep academics with workplace application, this group of students will now be prepared to pursue a focused post-secondary course and will have practical skills that will enable them to be valued and successful employees.

Tech Prep is about options. It's about establishing a line between classroom education and real-world employment needs. The program offers students who want careers in technical fields a continuum of learning and preparation—from high school, to an associate degree at a two-year community college program, or to a baccalaureate or higher degree. At any point along the continuum of learning, students can enter the workforce prepared to succeed in our technologically based society.

Tech Prep provides a blending of academic and technical competencies designed to raise expectation of students and to meet the needs of a technological workplace.

Tech Prep Program Goals

The philosophy of Tech Prep is the framework upon which the program functions. This commitment can be fulfilled through the attainment of the following goals that should help students to:

> Develop a valuable practical background for those students who are going on to formal schooling as well as giving basic technical training to those individuals seeking full-time employment in an engineering occupation.
>
> Develop a professional attitude toward his/her job so as to enable the student to more adequately cope with everyday engineering problems or decisions.
>
> Provide technical preparation in at least one field of engineering technology.
>
> Build competence in mathematics, science, and communications skills.
>
> Develop the personal characteristics, attitudes, skills and work habits that will enable them to be successful in an engineering occupation upon graduation.
>
> Develop learning experiences beyond the "how to" to perform the many activities in an engineering occupation and to know why those activities are essential.
>
> Explore and learn about the types of engineering jobs currently available and those in new emerging occupational areas.

Engineering Technologies Program Description

PROGRAM OVERVIEW

Engineering Technologies is a tech prep program that prepares students for careers in engineering occupations. The core curriculum and learning activities for the program are concerned with units on Computer Literacy, Career Exploration, Drafting/CAD Fundamentals, Safety Practices, Basic Electricity/Electronics, Introduction to Total Quality Management (TQM), Production Processes, and Employability Skills. During the senior year the students will focus on a curriculum career pathway in either Electronics Engineering or Graphics Communication.

POPULATION TO BE SERVED

The secondary Engineering Technologies programs in Westerville are open to all juniors and seniors. Students entering the program should have sufficient interest and ability to be able to accomplish the program objectives. Students in the Engineering Technologies program can also be described as follows:

1. Each student has an engineering or related occupational objective and is able to benefit from the training received and succeed in an engineering occupation.
2. Each student plans to attend a two-year or four-year college pursuing an associate or baccalaureate degree in engineering.
3. Each student has the desire to develop team working and decision making skills.
4. Each student is willing to participate in a mentorship phase of the program.
5. Each student is willing to comply with business standards acceptable in engineering and related occupations.
6. Each student has parental approval to participate in the program.
7. Each student enrolled in Engineering Technologies has been identified, counseled, and enrolled through the cooperative efforts of parents, administration, guidance, and tech prep teacher.

HOUSING OF THE PROGRAMS

The program consists of classroom and engineering lab experiences in both high school facilities. The junior core curriculum will be taught at both high schools. The Graphic Communications Engineering Technology program will be housed at Westerville North High School and the Electronics Engineering Technology program will be housed at Westerville South High School. Students may travel to the program of their choice during the senior year. Also, during the senior year, qualified students may take advantage of the Post-Secondary Enrollment Option (PSEO).

SUPERVISOR OF THE PROGRAM

District Vocational/Career Education Supervisor and Staff Development

OCCUPATIONS ADDRESSED BY THE PROGRAM

The core Engineering Technologies program prepares students for careers in drafting/CAD. The Engineering Technologies program concentrates on the basic core competencies required of those students preparing for entry-level and career-sustaining-level employment in engineering related occupations. Specifically students enrolled in the Graphics Communications career major will be qualified for the following occupations: Assistant Photographer, Drafting Technician, Beginning Drafter, CAD Operator, Composition Assistant, Computer Graphics Illustrator, Typesetter, Photoengraver Press Operator, Production Artist, Photographer, and Printing Estimator. Students who enrolled in the Electronics career major will be qualified for the following occupations: Component Assembler, Electronics Technician, Salesperson, Electronics Service Technician, Avionics Technician/Supervisor, Test Technician, Assistant Manufacturing Engineer, Engineering Technician, Product Technical Specialist and CAD Operator.

BASIC PROGRAM OPERATION

Tech Prep is a seamless curriculum that prepares students for advanced post-secondary training in Engineering Technologies. It is a dynamic mixture of rigorous academic course work and current technology, which uses applied academics to emphasize critical thinking and problem-solving strategies.

Classroom work involves collaborative, project-based learning that is directly related to successful performance in engineering occupations.

The engineering technology lab provides the students with the opportunity to gain realistic engineering competencies in a unique learning environment. The objectives of the laboratory are as follows:

1. Tech Prep students will be able to effectively apply engineering theory in the production of a product.
2. Tech Prep students will be able to apply individual critical thinking skills and individual and group decision-making skills in a realistic engineering situation.
3. Tech Prep students will work in teams toward common goals, applying what they learn in the classroom to real world projects.

PREREQUISITES

The secondary Tech Prep program is open to all high school juniors and seniors. It is recommended that students take Keyboarding, Career Focus, High Tech Systems I and II and Exploratory Computer Applications during the 9th and 10th grades. The students must apply and be selected to participate in the program. The task of student selection requires several steps: (1)

compilation of a list of prospective students, (2) preliminary screening, (3) study of cumulative records, (4) interviews with students, (5) study of recommendations and (6) notification of results. All final responsibility for student selection and enrollment rests with the Tech Prep teacher.

APPLIED ACADEMICS

Academic areas of science and mathematics are infused in the classroom curriculum. Algebra 2 and Physics will be blocked with the Tech Prep lab during the 11th and 12th grades.

TECHNOLOGY

Knowledge and skill development in current technologies is infused throughout the curriculum. The curriculum also includes basic computer literacy, teaches CAD skills, and encourages the use of on-line technology.

CRITICAL THINKING AND DECISION MAKING

Developing and using critical-thinking skills to make wise decisions is an integral part of classroom instruction and lab learning activities. Students learn decision-making techniques through the "problem-solving" approach. Problem solving includes the identification of options, the selection and testing of an option and determination of a solution.

EMPLOYABILITY SKILLS

Instruction in employability skills is given as an integral part of the related classroom instruction and is enriched through the student's required mentorship experience.

LIFELONG LEARNING CONCEPTS

This program teaches fundamental communications, mathematics and engineering concepts that are relatively constant over time. Building upon these fundamental concepts in the future will be additional educational experiences for the majority of the tech prep students as well as occupational experiences and advances. The program also requires students to develop competency in selecting and preparing for an occupation, solving problems, decision-making and comparing and analyzing job-placement.

ARTICULATION AGREEMENT

Through membership in the Heart of Ohio Tech Prep Consortium, an articulation agreement is currently in place with Columbus State Community College and Ohio University—Lancaster. At Columbus State Community College students will receive college credit for the technical competencies taught during the high school program upon verification of competencies mastered by the tech prep teacher. The student will have to take a placement test to verify competenance in academic courses. At Ohio University—Lancaster students must take proficiency tests to receive credit.

PROGRAM LENGTH: 450 hours minimum at grades 11 and 12

Engineering Technologies Program Summary

JUNIOR ACADEMIC COURSES

Communications (competencies target preparing students to place into English 111)
*Math—Algebra 2 or appropriate math series
Chemistry (recommended as an elective)

JUNIOR CORE TECHNICAL SKILL UNITS OF INSTRUCTION

Computer Literacy
Career Exploration
Drafting/CAD Fundamentals Technology
Safety Practices
Basic Electricity/Electronics
Introduction to Total Quality Management
Production Processes
Employability Skills

SENIOR ACADEMIC COURSES

Communications--competencies should target preparing students to place into English 111
Mathematics--Algebra 2 or Pre-College Math
*Science--Physics

SENIOR TECHNICAL CAREER MAJORS**

Graphics Communications Engineering Technology Units of Instruction

Mechanical CAD Drafting
Black & White Photography
Introduction to Computer Graphics
Electronic Publishing
Computer Graphics Illustrations

Electronics Engineering Technology Units of Instruction

Mechanical/Electronics CAD Drafting
DC Fundamentals
DC Laboratory
PC Hardware

*Recommended academic course to be blocked with 100 minute tech prep program, taught in an applied, problem-solving approach depending on career major.
Lab = 150 minutes (100 minutes for technical + 50 minutes for academic competencies)
The junior core would be taught to all pre-engineering students regardless of senior career major option.
Course credit at Ohio University–Lancaster will be determined by proficiency exams.
A mentorship experience is recommended as an option/elective at either junior or senior year.
**CAD is the senior technical core.
PSEO is a viable senior option.

Engineering Technologies Curriculum Pathway Narrative
Westerville Schools

Students interested in a high-tech career in engineering should complete the courses listed below in high school. This program will allow the students to enter a technical school with advanced placement in required technology courses through a 4+2 agreement with Columbus State Community College and/or Ohio University--Lancaster.

Tech Prep is designed to give maximum flexibility to student choices. Students will complete college academic requirements plus selected Tech Prep Level 1 courses during grades 9 and 10 (see list below) and take regular college prep academics. Then during grades 11 and 12, students will select a Level 2 Tech Prep Program in Engineering Technologies with a career major in grade 12. There is a strong emphasis on applying academic principles and working in teams to accomplish assigned projects throughout the sequence of Engineering Core Tech Prep program. During grades 11 and 12, the Tech Prep Engineering teacher will team with the mathematics and science teachers to integrate academic courses during the 3-hour block program. This would require that the tech prep and academic teachers have a common planning time.

During grade 11, students will participate in a mentorship experience. During grade 12, students who qualify may choose to enter the Post-Secondary Enrollment Option (PSEO) program at Columbus State Community College or may have the opportunity to obtain work experience in industry to gain technical competencies.

Upon completion of the high school Tech Prep program, students may immediately enter the job market, a post-secondary associate degree program, or a four-year baccalaureate degree program.

A four-year plan has been developed to help student to plan their high school program. The following courses are recommended for a Tech Prep student.

Subjects Required	Credits
English	4.00
Mathematics - see explanation #1	4.00
Algebra I/Integrated 1	
Geometry/Integrated 2	
Algebra 2 or appropriate math series	
Algebra 3/FST/Pre-College Math	
Laboratory Science	3.00
Biology	
Ecology	
Chemistry	
Physics (recommended grade 12 with Tech Prep)	
Advanced Biology	

Advanced Chemistry	
Advanced Physics	
Social Studies	3.00
Tech Prep Level 1 (Grades 9 and/or 10)	
Basic Keyboarding	.50
Career Focus	.625
High Tech Systems I and II (repeatable)	.50
Exploratory Computer Applications	.50
Quest 1: The Individual	.625
Tech Prep Level 2 (Grades 11 and 12)	2.00 (each year)
Engineering Technology with Geometry or Geometry or Algebra II (11th) and Physics (12th)	1.00 (each year)
Health/Physical Education	1.00

Subjects Recommended But Not Required for Tech Prep Associate Degree

Foreign Language	2.00
Visual/Performing Arts	1.00

1. Tech Prep students need to achieve a minimum of Algebra 2 or Pre-College Math credit. If students need to start with Integrated 1, then the sequence would be Integrated 1, Integrated 2, Geometry, and Pre-College Math.

   FST or Algebra 3 is a recommended option after Algebra 2.

Proposed Four-Year Tech Prep Program
Engineering Technologies

9th Grade

1 TP–Keyboarding–.50 cr.*
TP–Career Focus –.625 cr.*
2 TP–High Tech Systems I, –.50 cr.*
Phy. Ed. I – .50 cr.
3 Math (Algebra 1 I/Integrated 1) –1.0 cr.
4 English 9 – 1.0 cr.
5 Lunch
6 Science (Biology or Ecology) – 1.0 cr.
7 World Hist I (1/2 sem) – .50 cr.
Health – .50 cr.

Electives: PE (.25) 2 sem. req., Health (.50), Foreign Language, Fine Arts (.50)

Recommend students take 1 year fine. arts and 2 years of foreign language if they want to keep acceptance to a competitive 4-yr. college as an option.

Band/Choir (per. 4/5)–Would need 8 periods for a person in band/choir.

*Required for TP/open to all students.

10th Grade

1 Social Studies (World Hist 2)–1 sem. .50 cr.
Fine Arts (1 sem.) .50 cr.
2 English 10 – 1.0 cr.
3 Science/Elective – 1.0 cr.
4 Lunch
5 Math (Geometry/Integrated II) – 1.0 cr.
6 TP–Exploratory Computer Applications**
TP–High Tech Systems II – .50 cr.**
7 Elective

Electives: PE (.25) 2 sem. req., Health (.50), Foreign Language

**Open to all students interested in Tech Prep.

11th Grade (Block 3 periods for TP)

1-3 TP–Technical Engineering Core–2.0 cr.
TP– Math–(Algebra 2 or appropriate math) – 1.0 cr.
TP–Mentorship Experience –.625 cr.*
4 Lunch
5 Social Studies
6 English 11 – 1.0 cr.
7 Science–Chemistry – 1.0 cr.

Electives: Foreign Language, Fine. Arts

Prerequisites for 11th grade TP–Passage of all parts of 9th grade proficiency test is recommended.

11th Options: Lab plus Mentorship experience.

TP should be blocked 3 periods for State Funding.

12th Grade (Block 3 periods for TP)

1 Social Studies (Gov.–.5)/Social Studies (.50 cr.)
2 Applied Lang. Arts /English 12 (Optional)
3 Algebra 2 or Pre-College Math (Optional) 1.0 cr.
4 Lunch

5-7 Tech Prep Engineering Core/Career Major 2.0 cr.
TP–Technical Lab 1st sem./work exp. 2nd sem.
TP–Team Projects
TP–Science (Physics) (1.0 cr.)

or TP–Work Experience 2.0 cr.
or Post Secondary Enrollment Option (PSEO)

Electives: Foreign Language, science

12th Grade Options: Lab all year, Academic and Work Experience, or Post-secondary Enrollment Option.

Recommended courses: 4 yr. English, 3 cr. Social Studies, 3 cr. Sciences (Biology or Ecology, Chemistry, Physical), and 1 cr. Fine. Arts, 2 cr. Foreign Language, 3 cr. math through Algebra II or Pre-College Math.

Heart of Ohio Tech Prep Consortium
Engineering Technologies Core Model
Approved May 1997

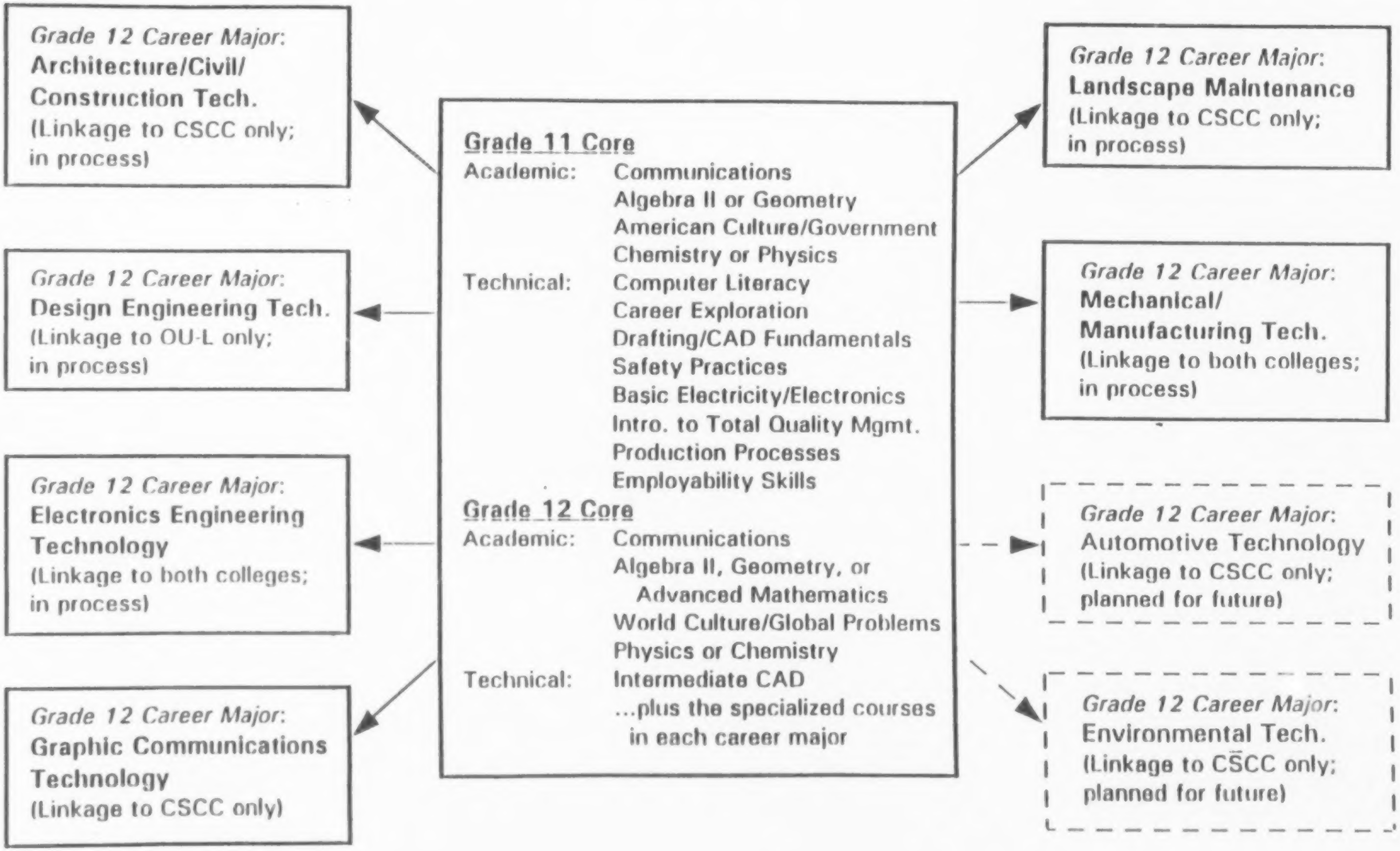
Engineering Technologies
Core Units of Instruction

NOTE: The Engineering Technologies Core Model chart on the next page illustrates the link between the Core Technical units taught to all Engineering students and the array of Career Majors at the two post-secondary institutions. In Westerville we plan to offer during grade 12 the Electronics Engineering Technology career major at Westerville South High School and the Graphic Communications Technology career major at Westerville North High School.

Starting on page 18 the competencies and competency objectives are listed for the units that will be taught during the technical block portion of the tech prep program for grades 11. These competencies were developed in cooperation with the Heart of Ohio Tech Prep Consortium (Columbus State Community College, Ohio University—Lancaster, and six participating secondary school districts) and were industry validated in May, 1997. The competencies were derived from the college courses that are struck-out on the pathway charts on page 51 and 72 and selected courses page 76.

ENGINEERING TECHNOLOGIES CORE MODEL

Rev. 5/7/97



Grade 12 Career Major:
Architecture/Civil/ Construction Tech.
(Linkage to CSCC only; in process)

Grade 12 Career Major:
Design Engineering Tech.
(Linkage to OU-L only; in process)

Grade 12 Career Major:
Electronics Engineering Technology
(Linkage to both colleges; in process)

Grade 12 Career Major:
Graphic Communications Technology
(Linkage to CSCC only)

Grade 11 Core

Academic:
- Communications
- Algebra II or Geometry
- American Culture/Government
- Chemistry or Physics

Technical:
- Computer Literacy
- Career Exploration
- Drafting/CAD Fundamentals
- Safety Practices
- Basic Electricity/Electronics
- Intro. to Total Quality Mgmt.
- Production Processes
- Employability Skills

Grade 12 Core

Academic:
- Communications
- Algebra II, Geometry, or Advanced Mathematics
- World Culture/Global Problems
- Physics or Chemistry

Technical:
- Intermediate CAD
- ...plus the specialized courses in each career major

Grade 12 Career Major:
Landscape Maintenance
(Linkage to CSCC only; in process)

Grade 12 Career Major:
Mechanical/ Manufacturing Tech.
(Linkage to both colleges; in process)

Grade 12 Career Major:
Automotive Technology
(Linkage to CSCC only; planned for future)

Grade 12 Career Major:
Environmental Tech.
(Linkage to CSCC only; planned for future)

NOTE: Aviation Maintenance Technology at Columbus State may be accessed through a technical articulation agreement; however no Tech Prep linkage is feasible.

Explanation of Competency Leveling

Columns of the Chart:

11 = By the end of the 11th grade

12 = By the end of the 12th grade

AD = By the end of the Associate Degree

WS = On-the-job training the occurs at an actual worksite

LL = Lifelong Learning

Codes to be used:

I = Introduce competency and competency objectives

R = Reinforce or add depth (after introducing or mastery)

M = Master, competent, or proficient (achievement of the competency and all its competency objectives)

UNIT: 7.01 Computer Literacy

MECH 112

LEVEL		**11**	**12**	**AD**	**WS**	**LL**
7.01.01 Competency: Demonstrate basic use of computer operating system						
Competency Objectives:						
7.01.01.01	Create ASCII text files with a text editor	I	M			
7.01.01.02	Explain rules for naming files and directories	M	R	R		
7.01.01.03	Manage files	M	R	R		
7.01.01.04	Create directories	M	R	R		
7.01.01.05	Remove directories	M	R	R		
7.01.01.06	Change directories	M	R	R		
7.01.01.07	Copy files	M	R	R		
7.01.01.08	Rename files	M	R	R		
7.01.01.09	Erase files	M	R	R		
7.01.01.10	Format diskettes	M	R	R		
7.01.01.11	Label diskettes	M	R	R		
7.01.01.12	Explain the syntax of operating system commands	I	M	R		
7.01.01.13	Use wild-cards in operating system commands	I	M	R		
7.01.02 Competency: Perform computer operations						
Competency Objectives:						
7.01.02.01	Explain how data is stored in main computer memory	I	R			
7.01.02.02	Explain how a computer system executes program instructions	I	R			
7.01.02.03	Explain computer storage capacity	M				
7.01.02.04	Explain how data is represented	I	R			
7.01.02.05	Describe data storage techniques	I	R			
7.01.02.06	Identify types of memory	I	R			
7.01.02.07	Explain PC layouts	I	R			
7.01.02.08	Differentiate between hardware and software	M	R			
7.01.02.09	Differentiate open and proprietary architecture	M	R			
7.01.02.10	Practice proper media handling techniques (e.g., magnetic fields, dust, liquids)	M	R			
7.01.02.11	Use hardware (e.g., mouse, diskettes, drive, modems, touch screen, printers, digitizers, scanners, cables, protection devices)	M	R			

LEVEL		11	12	AD	WS	LL
7.01.02.12	Demonstrate basic care of hardware	M	R			
7.01.02.13	Perform basic hardware troubleshooting	I	R			
7.01.02.14	Describe and access computer help files	M	R			
7.01.03 Competency: Describe the operation of computer system software						
Competency Objectives:						
7.01.03.01	Define operating systems (e.g., DOS, OS/2, UNIX, MAC, WINDOWS)	M	R			
7.01.03.02	Describe computer languages and their use	I	R			
7.01.03.03	Describe differences between data files and program files	M	R			
7.01.03.04	Define software types and functions	I	R			
7.01.03.05	Describe basic disk operations and care	M	R			
7.01.03.06	List advantages and disadvantages of integrated and dedicated software	I	R			
7.01.03.07	Use knowledge of DOS to reconstruct files that are deleted or damaged	I	R			
7.01.03.08	Install/reinstall system software	I	R			
7.01.03.09	Perform basic software troubleshooting	I	R	M		
7.01.04 Competency: Operate computer software						
Competency Objectives:						
7.01.04.01	Install computer software	M	R			
7.01.04.02	Configure computer software	M	R			
7.01.04.03	Operate diagnostic software	I	R	M		
7.01.04.04	Keyboard efficiently	R	R	R		
7.01.04.05	Demonstrate basic proficiency in spreadsheet use in solving simple engineering problems	R	R	R		
7.01.04.06	Demonstrate basic proficiency in word processing	R	R	R		
7.01.04.07	Demonstrate basic proficiency in database use	R	R	R		
7.01.04.08	Demonstrate basic proficiency in network use	R	R	R		
7.01.04.09	Demonstrate basic proficiency in utility (e.g., Windows, GUI)	I	R	M		
7.01.04.10	Demonstrate basic proficiency in report writing	R	R	R		
7.01.04.11	Demonstrate system commands	I	R	M		
7.01.04.12	Use electronic mail/world-wide web	R	R	R		

LEVEL		11	12	AD	WS	LL
7.01.05 Competency: Demonstrate the use of computer security						
Competency Objectives:						
7.01.05.01	Explain need for and application of security levels/procedures	I	R	R		
7.01.05.02	Describe ethical use/misuse of software	I	R	R		
7.01.05.03	Use bulletin boards/electronic mail/internet security	R	R	R		
7.01.05.04	Apply security levels/procedures while handling sensitive data	I	R	R		
7.01.05.05	Explain data compression	I	R	R		
7.01.05.06	Use and delete passwords	M	R	R		
7.01.05.07	Explain virus/virus protection techniques	I	R	R		

UNIT: 7.02 Career Exploration MECH 110						
LEVEL		**11**	**12**	**AD**	**WS**	**LL**
7.02.01 Competency: Explore engineering careers						
Competency Objectives:						
7.02.01.01	Explain the engineering team concept	I	M			
7.02.01.02	Differentiate among engineer, engineering technologist, and engineering technician	M	R			
7.02.01.03	Explore available career opportunities within engineering technologies	I	M			
7.02.01.04	Define the preparation required for engineer, engineering technologist, and engineering technician	M	R			
7.02.01.05	Explain manufacturing, design, construction practices, and their significance from historical, contemporary and future prospective	I	M			
7.02.02 Competency: Explore potential engineering technology career paths						
Competency Objectives:						
7.02.02.01	Define the make-up of basic business enterprises (includes proprietorships through government agencies)	I	M			
7.02.02.02	Explore the role of professional and technical societies	I	M			
7.02.02.03	Describe opportunities for career advancement	M	R			
7.02.02.04	Describe additional educational and/or training opportunities	M	R			

UNIT: 7.03 Drafting/CAD Fundamentals

LEVEL		11	12	AD	WS	LL
7.03.01 Competency: Introduction to mechanical drafting						
Competency Objectives:						
7.03.01.01	Describe the need for the "language" of drafting	I	M	R	R	
7.03.01.02	Describe the typical drafting department	I	M	R	R	
7.03.01.03	Demonstrate the use of drafting equipment and supplies	I	M	R	R	
7.03.01.04	Identify line styles and weights (alphabet of lines)	I	M	R	R	
7.03.01.05	Operate a blue line print machine	I	M	R	R	
7.03.01.06	Develop basic drafting skills	I	M	R	R	
7.03.01.07	Demonstrate lettering techniques	I	M	R	R	
7.03.01.08	Demonstrate proper line techniques	I	M	R	R	
7.03.02 Competency: Correctly setup and use manual drafting tools to produce a quality drawing						
Competency Objectives:						
7.03.02.01	Clean, maintain and adjust the parallel bar or drafting machine	I	M	R	R	
7.03.02.02	Lay down and align a sheet of drafting vellum on the work surface ready for drafting	I	M	R	R	
7.03.02.03	Use a sand pad for sharpening lead compass points and/or a pencil pointer for sharpening lead holder points	I	M	R	R	
7.03.02.04	List the various hardness of graphite leads and corresponding numbers	I	M	R	R	
7.03.02.05	Use the Ames Lettering Guide to produce guidelines for consistent free-hand letter heights	I	M	R	R	
7.03.02.06	Maintain and use the compass to produce circular curves and ellipses	I	M	R	R	
7.03.02.07	Maintain lead holders and utilize the proper rotational method to maintain a conical point when drawing lines	I	M	R	R	
7.03.02.08	Identify the units on an Architect's scale and use the scale to lay out dimensions on a drawing	I	M	R	R	
7.03.02.09	Identify the units on an Engineer's scale and use the scale to lay out dimensions on a drawing	I	M	R	R	

LEVEL		11	12	AD	WS	LL
7.03.03 Competency: Develop a consistent free-hand (letter height, spacing and legibility) lettering style						
Competency Objectives:						
7.03.03.01	Apply the appropriate lettering sizes to dimensions	I	M	R	R	
7.03.03.02	Apply the appropriate lettering sizes to notes	I	M	R	R	
7.03.03.03	Apply the appropriate lettering sizes to sub-titles	I	M	R	R	
7.03.03.04	Apply the appropriate lettering sizes to titles	I	M	R	R	
7.03.04 Competency: Develop basic sheet elements and draw simple geometric constructions						
Competency Objectives:						
7.03.04.01	Pre-plan a sheet for optimum placement of drawings and for space usage on the sheet	I	M	R	R	
7.03.04.02	Develop borders and title blocks	I	M	R	R	
7.03.04.03	Draw lines at 15° increments radiating from a central point using a combination the 45° and the 30°-60° triangles	I	M	R	R	
7.03.04.04	Use circle templates, and irregular or adjustable curves to produce arcs, spirals and irregular lines	I	M	R	R	
7.03.04.05	Construct geometric shapes including, circles, polygons and non-regular shapes	I	M	R	R	
7.03.05 Competency: Draw and dimension orthographic projections						
Competency Objectives:						
7.03.05.01	Define drafting terminology (i.e., reference planes, etc.)	I	M	R	R	
7.03.05.02	Sketch orthographic views	I	M	R	R	
7.03.05.03	Draw single-view drawings orthographic drawings	I	M	R	R	
7.03.05.04	Draw two-view orthographic drawings	I	M	R	R	
7.03.05.05	Draw multi-view projections from pictorial drawings and/or actual mechanical parts	I	M	R	R	
7.03.05.06	Identify and properly draw various line from the alphabet of lines	I	M	R	R	
7.03.05.07	Use a CAD system to draw and dimension orthographic drawings	I	M	R	R	

LEVEL		11	12	AD	WS	LL
7.03.06 Competency: Explain and illustrate the relationships of view in orthographic projection						
Competency Objectives:						
7.03.06.01	Develop two dimensional (orthographic views) from three dimensional object, including straight, curved surfaces, and oblique surfaces	I	M	R	R	
7.03.06.02	Generate auxiliary view of oblique surfaces to develop true size and shapes of planes	I	M	R	R	
7.03.06.03	Reproduce a simple floor plan at an appropriate scale using proper line weights to identify full height and lesser walls, built-in items, and fixtures	I	M	R	R	
7.03.07 Competency: Use the current industry standard method of dimensioning and referencing drawings						
Competency Objectives:						
7.03.07.01	Use datum elevation bullets for height notations on elevations and sections	I	M	R	R	
7.03.07.02	Apply the correct scale to various types of drawings; i.e., site plans, floor plans, elevations and sections cuts	I	M	R	R	
7.03.07.03	Use various line weights (widths) to convey the illusion of depth, distance or separation	I	M	R	R	
7.03.07.04	Use common architectural dimensioning system, including continuous dimension strings	I	M	R	R	
7.03.08 Competency: Describe the inter-relationship of computer hardware and software comprising a CAD drafting system						
Competency Objectives:						
7.03.08.01	List and describe the hardware components necessary to support CAD drafting system	I	M	R	R	
7.03.08.02	Describe the inter-relationship of the software comprising the CAD drafting system and differentiate between the operating system the applications software	I	M	R	R	

LEVEL		11	12	AD	WS	LL
7.03.08.03	Use the operating system to format storage devices (diskettes) to save files and to enter and exit the CAD application program; be familiar with file utility command for creating a new drawing, opening an existing file and ending a drawing session	I	M	R	R	
7.03.08.04	Identify the various components depicted on the graphics screen, i.e., pull down menus, icons, and dialogue boxes; use the mouse (puck) to pick, enter (accept), and cancel from the screen or tablet	I	M	R	R	
7.03.08.05	Compare and contrast the organization, elements (font size, dimensioning practices and sheet organization) and drawing setup procedures for manual drafting and CAD drafting	I	M	R	R	
7.03.08.06	Use the function keys to control graphic screen actions	I	M	R	R	
7.03.09 Competency: Describe the function of and use the drawing commands in a CAD system to set up and create a drawing						
Competency Objectives:						
7.03.09.01	Describe and use the drawing units commands involving unit settings, layers, scaling and line types to create a proto-type drawing	I	M	R	R	
7.03.09.02	Describe and use the drawing commands involving lines polylines, circles arcs, ellipses and regular polygon shapes to create borders on a proto-type drawing	I	M	R	R	
7.03.09.03	Describe standard drawing for formats and use the layering system to produce multiple drawings from a common "seed" file	I	M	R	R	
7.03.10 Competency: Apply CAD skills						
Competency Objectives:						
7.03.10.01	Identify line styles and weights (alphabet of lines)	I	M	R	R	
7.03.10.02	Select proper drawing scale	I	M	R	R	
7.03.10.03	Prepare title blocks and other drafting formats	I	M	R	R	
7.03.10.04	Prepare orthographic views	I	M	R	R	
7.03.10.05	Prepare and describe change control block/revision block	I	M	R	R	

LEVEL		11	12	AD	WS	LL
7.03.10.06	Measure angles	I	M	R	R	
7.03.10.07	Draw horizontal, vertical, angular, parallel, and perpendicular lines	I	M	R	R	
7.03.10.08	Transfer an angle	I	M	R	R	
7.03.10.09	Construct tangent lines (to arcs) and tangent arcs (to arcs)	I	M	R	R	
7.03.10.10	Bisect angles and arcs	I	M	R	R	
7.03.10.11	Bisect lines	I	M	R	R	
7.03.10.12	Divide lines	I	M	R	R	
7.03.11 Competency: Describe the function of and use CAD system editing commands to modify and accelerate the drawing process						
Competency Objectives:						
7.03.11.01	Describe and use the editing commands to zoom, pan, oops, redraw/regenerate, undo, erase, redo and set the view resolution to create and edit drawings	I	M	R	R	
7.03.11.02	Describe and use the editing commands to offset, trim and extend lines and to create fillets at the intersection of lines	I	M	R	R	
7.03.11.03	Describe and use the editing commands involving moving, copying, scaling, rotating, breaking and stretching to modify the drawing; use the array and mirroring command to accelerate the drawing	I	M	R	R	
7.03.11.04	Describe and use the editing commands involving dividing, exploding and measuring lines	I	M	R	R	
7.03.12 Competency: Draw working drawings						
Competency Objectives:						
7.03.12.01	Draw auxiliary views	I	M	R	R	
7.03.12.02	Draw sectional views	I	M	R	R	
7.03.12.03	Complete title blocks and revision charts	I	M	R	R	
7.03.12.04	Calculate tolerances and include on drawings	I	M	R	R	
7.03.12.05	Use a CAD system to draw/dimension working drawings	I	M	R	R	
7.03.13 Competency: Construct pictorial drawings						
Competency Objectives:						
7.03.13.01	Sketch pictorial drawings	I	M	R	R	
7.03.13.02	Draw oblique drawings	I	M	R	R	

LEVEL		11	12	AD	WS	LL
7.03.13.03	Draw isometric projects from orthographic views	I	M	R	R	
7.03.13.04	Complete a perspective drawing	I	M	R	R	
7.03.13.05	Use a CAD system to draw pictorials	I	M	R	R	
7.03.14 Competency: Apply commonly used CAD commands						
Competency Objectives:						
7.03.14.01	Describe and use the object snaps, selection settings, and precision inputs to control the drawing process	I	M	R	R	
7.03.14.02	Describe and use the inquiry commands to check the drawing	I	M	R	R	
7.03.14.03	Describe and use the text commands to create text styles, set text size, annotate and correctly place text in the drawing	I	M	R	R	
7.03.14.04	Describe and use dimensioning commands to establish dimension accuracy, settings and positioning of dimensions on the architectural floor plan of a small office building	I	M	R	R	

UNIT: 7.04 Safety Practices

Core items only. Does not include career major specific items.

LEVEL		11	12	AD	WS	LL
7.04.01 Competency: Apply workplace safety rules and procedures						
Competency Objectives:						
7.04.01.01	Identify personal protective wear and equipment	M	R	R		
7.04.01.02	Identify visual controls (e.g., monitors, read outs)	M	R	R		
7.04.01.03	Identify auditory controls	M	R	R		
7.04.01.04	Use personal protective wear and equipment	M	R	R	R	
7.04.01.05	Apply fire safety rules and procedures	M	R	R	R	
7.04.01.06	Apply hazardous wastes rules and procedures	M	R	R	R	
7.04.01.07	Apply workplace safety rules and procedures	M	R	R	R	
7.04.01.08	Apply workplace organization (e.g., housekeeping)	M	R	R	R	
7.04.01.09	Apply applicable electrical, mechanical, steam, hydraulic and other (e.g., pneumatic) safety rules and procedures	M	R	R	R	
7.04.02 Competency: Apply basic first aid						
Competency Objectives:						
7.04.02.01	Identify need and procedure for reporting accidents	M	R	R	R	
7.04.02.02	Identify and apply basic first aid rules and procedures	M	R	R	R	
7.04.02.03	Maintain first aid kit	M	R	R	R	
7.04.03 Competency: Demonstrate knowledge of ergonomics						
Competency Objectives:						
7.04.03.01	Define ergonomics	I	M	R	R	
7.04.03.02	Define risk factor	M	R	R	R	
7.04.03.03	Define cumulative trauma disorder (CTD)	I	M	R	R	
7.04.03.04	Minimize repetitive tasks	I	M	R	R	
7.04.03.05	Minimize awkward body positions	I	M	R	R	
7.04.03.06	Explain use of rest pauses	M	R	R	R	
7.04.03.07	Explain need for appropriate working heights of chairs, stools, workbenches, equipment	M	R	R	R	
7.04.03.08	Explain need for adequate lighting	M	R	R	R	

LEVEL		**11**	**12**	**AD**	**WS**	**LL**
7.04.04 Competency: Maintain safe work environment						
Competency Objectives:						
7.04.04.01	Follow safety procedures according to Occupational Safety and Health Administration (OSHA) Guidelines	I	M	R	R	
7.04.04.02	Wear eye protection when instructed	M	R	R	R	
7.04.04.03	Follow lab rules	M	R	R	R	
7.04.04.04	Demonstrate proper handling of hazardous substances	M	R	R	R	
7.04.04.05	Identify, use and care for handtools	I	M	R	R	
7.04.04.06	Demonstrate the location and function of the emergency power kill switch	M	R	R	R	
7.04.04.07	Demonstrate proper emergency action techniques	M	R	R	R	

UNIT: 7.05 Basic Electricity/Electronics
EET 101

LEVEL		11	12	AD	WS	LL
7.05.01 Competency: Identify and describe basic electrical systems, components and theories						
Competency Objectives:						
7.05.01.01	Identify various sources of electricity	I	M	R	R	
7.05.01.02	Describe atomic structure (its relationships to electricity)	I				
7.05.01.03	Identify electrical components	M	R	R	R	
7.05.01.04	Apply Ohms's law	M	R	R	R	
7.05.01.05	Safely and accurately measure voltage, resistance and current	M	R	R	R	
7.05.01.06	Create and interpret basic electrical schematics	M	R	R	R	
7.05.02 Competency: Apply the elements of physics that pertain to direct current						
Competency Objectives:						
7.05.02.01	Demonstrate the ability to use scientific notation	M	R	R	R	
7.05.02.02	Solve problems of conversion using both metric and English measuring systems	M	R	R	R	
7.05.02.03	Solve problems involving the inter-relationship of basic electrical units and the application of scientific notation	M	R	R	R	
7.05.02.04	Describe atomic theory and the relationship of conductance to atomic structure	I	R	R	R	
7.05.02.05	Describe what makes certain materials good conductors, insulators, and semi-conductors	I	R	R	R	
7.05.02.06	Solve problems using the inter-relationship of current, voltage, and resistance	M	R	R	R	
7.05.02.07	Describe the application of various sources of electrical energy	M	R	R	R	
7.05.03 Competency: Construct DC circuits						
Competency Objectives:						
7.05.03.01	Determine resistor values	M	R	R	R	
7.05.03.02	Construct and analyze simple DC circuits	M	R	R	R	
7.05.03.03	Construct and analyze series DC circuits	I	R	R	R	
7.05.03.04	Construct and analyze parallel DC circuits	I	R	R	R	

LEVEL		11	12	AD	WS	LL
7.05.03.05	Construct and analyze series-parallel circuits	I	R	R	R	
7.05.03.06	Use a DC motor	I	R	R	R	
7.05.04 Competency: Construct AC circuits						
Competency Objectives:						
7.05.04.01	Describe the function of a transformer	I	M	R	R	
7.05.04.02	Construct and analyze simple AC circuits	I	M	R	R	
7.05.04.03	Construct and analyze series AC circuits	I	M	R	R	
7.05.04.04	Construct and analyze parallel AC circuits	I	M	R	R	
7.05.04.05	Construct and analyze series-parallel circuits	I	M	R	R	
7.05.04.06	Solve inductive and capacitive reactance problems	I	M	R	R	
7.05.04.07	Use an AC motor	I	M	R	R	
7.05.04.08						
7.05.05 Competency: Control circuits						
Competency Objectives:						
7.05.05.01	Rate batteries	I	R	R	R	
7.05.05.02	Identify typical control components	I	M	R	R	
7.05.05.03	Read and interpret schematics and control diagrams	I	M	R	R	
7.05.05.04	Connect motor to control circuits	I	M	R	R	
7.05.05.05	Connect programmable controls to circuits	I	M	R	R	
7.05.05.06	Program programmable controller	I	M	R	R	
7.05.05.07	Troubleshoot circuits	I	M	R	R	

UNIT: 7.06 Total Quality Management (TQM) QUAL 240						
LEVEL		**11**	**12**	**AD**	**WS**	**LL**
7.06.01 Competency: Explain the history of Total Quality Management (TQM)						
Competency Objectives:						
7.06.01.01	Identify major phases in the history of quality and describe their characteristics	I	R	R	R	
7.06.01.02	Describe and compare the philosophies and principles of gurus in quality, including Deming, Juran, Crosby, Ishikawa, Shewhart, and Taguchi	I	R	R	R	
7.06.02 Competency: Describe the implementation of Total Quality Management (TQM)						
Competency Objectives:						
7.06.02.01	Describe factors which influence change in organizations and the importance of management by data and systems for continuous improvement in quality	I	R	R	R	
7.06.02.02	Differentiate leadership from management and describe the characteristics of principle centered leaders and empowerment	I	R	R	R	
7.06.02.03	Describe structures conducive to TQM (including Malcolm Baldridge, ISO-9000 and the Deming prize)	I	R	R	R	
7.06.02.04	Identify customers, suppliers and their expectations	I	M	R	R	
7.06.02.05	Identify methods for improving customer and supplier relations	I	M	R	R	
7.06.02.06	Describe the mission and composition of quality improvement teams	I	M	R	R	
7.06.02.08	Describe the mission and composition of process improvement teams	I	M	R	R	
7.06.02.09	Describe why some TQM programs fail	I	R	R	R	
7.06.02.10	Describe the future of TQM	I	R	R	R	
7.06.02.11	Define the cost of quality	I	R	R	R	
7.06.02.12	Implement TQM concepts	I	M	R	R	

LEVEL		11	12	AD	WS	LL
7.06.03 Competency: Apply effective team practice to support quality						
Competency Objectives:						
7.06.03.01	Choose a leader	M	R			
7.06.03.02	Divide work	M	R			
7.06.03.03	Determine roles and responsibilities	M	R			
7.06.03.04	Demonstrate practices for reaching consensus (e.g., nominal group practice, balloting, focus groups)	M	R			
7.06.03.05	Write job descriptions	I	M	R	R	R
7.06.03.06	Enforce accountability	I	M	R	R	R
7.06.03.07	Use the tools of TQM (such as story boards, flow charting, SPC, parato analyst, histograms, etc.)	I	M	R	R	R

UNIT: 7.07 Production Processes

MECH 111

LEVEL		11	12	AD	WS	LL
7.07.01 Competency: Apply basic manufacturing skills						
Competency Objectives:						
7.07.01.01	Describe atomic structure	I	R			
7.07.01.02	Describe the nature of common manufacturing materials	I	M			
7.07.01.03	Describe the organization of modern manufacturing plants	I	M			
7.07.01.04	Describe and demonstrate the casting and molding of metal materials	M	R	R		
7.07.01.05	Describe and demonstrate the casting and molding of plastic materials	M	R	R		
7.07.01.06	Describe and demonstrate the hot and cold forming of metal materials	M	R	R		
7.07.01.07	Describe and demonstrate the hot and cold forming of plastic materials	M	R	R		
7.07.01.08	Describe and demonstrate the hot and cold forming of ceramic materials	M	R	R		
7.07.01.09	Describe and demonstrate the hot and cold forming of powdered metal materials	M	R	R		
7.07.01.10	Describe and demonstrate the welding of materials	M	R	R		
7.07.01.11	Describe and demonstrate adhesive techniques	M	R	R		
7.07.01.12	Describe and demonstrate mechanical fastening techniques	M	R	R		
7.07.02 Competency: Demonstrate safe machining techniques						
Competency Objectives:						
7.07.02.01	Demonstrate turning operations	M	R	R		
7.07.02.02	Demonstrate milling operations	M	R	R		
7.07.02.03	Demonstrate sawing operations	M	R	R		
7.07.02.04	Demonstrate broaching operations	I	R	R		
7.07.02.05	Demonstrate filing operations	M	R	R		
7.07.02.06	Demonstrate drilling operations	M	R	R		
7.07.02.07	Demonstrate boring operations	M	R	R		
7.07.02.08	Demonstrate reaming operations	M	R	R		
7.07.02.09	Demonstrate tapping operations	M	R	R		
7.07.02.10	Demonstrate abrasion machining operations	I	R	R		
7.07.02.11	Demonstrate chemical machining operations	I	R	R		
7.07.02.12	Demonstrate thermal machining operations	I	R	R		
7.07.02.13	Demonstrate sheet metal layouts	M	R	R		

LEVEL		11	12	AD	WS	LL
7.07.03 Competency: Demonstrate modern manufacturing plant techniques						
Competency Objectives:						
7.07.03.01	Design a manufacturing assembly line	I	R	R	R	
7.07.03.02	Implement a manufacturing assembly line	M	R	R		
7.07.03.03	Evaluate a manufacturing assembly line	M	R	R		
7.07.03.04	Perform torque test	I				

Employability Skills

UNIT: 7.08 Career Development						
LEVEL		**11**	**12**	**AD**	**WS**	**LL**
7.08 01 Competency: Investigate career options						
Competency Objectives:						
7.08.01.01	Determine interests and aptitudes	R	M	R		R
7.08.01.02	Identify career options	R	M	R		R
7.08.01.03	Research interests, knowledge, abilities, and skills needed in an occupations	R	M	R		R
7.08.01.04	Select careers that best match interests and aptitudes	R	M	R		R
7.08.01.05	Identify advantages and disadvantages of career options, including self-employment and nontraditional careers	R	M	R		R
7.08.02 Competency: Utilize career information						
Competency Objectives:						
7.08.02.01	Identify a range of career information resources	R	R	R		R
7.08.02.02	Use a range of resources to obtain career information (e.g., handbooks, career materials, labor market information, and computerized career-information delivery systems)	R	R	R		R
7.08.02.03	Demonstrate knowledge of various classification systems that categorize occupations and industries (e.g., *Dictionary of Occupational Titles*)	R	R	R		R
7.08.02.04	Describe the educational requirements of various occupations	I	R	R		R
7.08.02.05	Identify individuals in selected occupations as possible information resources, role models, or mentors	R	R	R		R
7.08.02.06	Describe the impact of factors such as population, climate, employment trends, and geographic location on occupational opportunities	I	R	R		R
7.08.02.07	Assess differences in the wages, benefits, annual incomes, cost of living, and job opportunities associated with selected career options	I	R	R		R
7.08.02.08	Determine labor market projections for selected career options	I	R	R		R

LEVEL		11	12	AD	WS	LL
7.08.03 Competency: Participate in a career exploration activity						
Competency Objectives:						
7.08.03.01	Identify career exploration activities (e.g., job shadowing, mentoring, volunteer experiences, part-time employment, and cooperative education)	I	R	R		R
7.08.03.02	Compare traits, skills, and characteristics required for specific career choices with individual's traits, skills, and characteristics	I	R	R		R
7.08.03.03	Recognize potential conflicts between personal characteristics and career choice areas	I	R	R		R
7.08.03.04	Describe the impact of exploration activities on current career choices	I	R	R		R
7.08.04 Competency: Assess the relationship between educational achievement and career planning						
Competency Objectives:						
7.08.04.01	Describe how skills developed in academic and vocational programs relate to career goals	I	M	R		R
7.08.04.02	Describe how education relates to the selection of a college major, further training, and/or entry into the job market	I	M	R		R
7.08.04.03	Identify skills that can apply to a variety of occupational requirements	I	M	R		R
7.08.04.04	Explain the importance of possessing learning skills in the workplace	I	M	R		R
7.08.05 Competency: Develop an individual career plan						
Competency Objectives:						
7.08.05.01	Identify career goal(s)	M	R	R		R
7.08.05.02	Identify worker conditions, education, training, and employment opportunities related to selected career goal(s)	M	R	R		R
7.08.05.03	Describe school and community resources available to help achieve career goal(s)	M	R	R		R
7.08.05.04	Identify career ladders possible within selected career goal(s)	M	R	R		R
7.08.05.05	Identify additional experiences needed to move up identified career ladders*	M	R	R		R
7.08.05.06	Recognize that changes may require retraining and upgrading of employees' skills	M	R	R		R

LEVEL		11	12	AD	WS	LL
7.08.06 Competency: Annually review/revise the individual career plan						
Competency Objectives:						
7.08.06.01	Identify experiences that have reinforced selection of the specific career goal(s) listed on the individual career plan	M	R	R		R
7.08.06.02	Identify experiences that have changed the specific career goal(s) listed on the individual career plan	M	R	R		R
7.08.06.03	Modify the career goal(s) and educational plans on the individual career plan	M	R	R		R
7.08.06.04	Ensure that parents or guardians provide input into the individual career plan process	M	R	R		R
7.08.06.05	Identify the correlation between the individual career plan and the actual courses to be taken in high school	M	R	R		R
7.08.06.06	Identify the correlation between the individual career plan and post-secondary training, adult education, or employment	M	R	R		R
UNIT: 7.09 Decision Making and Problem Solving						
7.09.01 Competency: Apply decision-making techniques in the workplace						
Competency Objectives:						
7.09.01.01	Identify the decision to be made	M	R	R	R	R
7.09.01.02	Compare alternatives	M	R	R	R	R
7.09.01.03	Determine the consequences of each alternative	M	R	R	R	R
7.09.01.04	Make decisions based on values and goals	M	R	R	R	R
7.09.01.05	Evaluate the decision made	M	R	R	R	R
7.09.02 Competency: Apply problem-solving techniques in the workplace						
Competency Objectives:						
7.09.02.01	Diagnose the problem, its urgency, and its causes	M	R	R	R	R
7.09.02.02	Identify alternatives and their consequences in relation to the problem	M	R	R	R	R
7.09.02.03	Recognize multicultural and nonsexist dimensions of problem solving	I	R	R	R	R
7.09.02.04	Explore possible solutions to the problem using a variety of resources	M	R	R	R	R
7.09.02.05	Compare/contrast the advantages and disadvantages of each solution	M	R	R	R	R
7.09.02.06	Determine appropriate action	M	R	R	R	R
7.09.02.07	Implement action	M	R	R	R	R

LEVEL		11	12	AD	WS	LL
7.09.02.08	Evaluate results of action implemented	M	R	R	R	R
UNIT: 7.10 Work Ethic						
7.10.01 Competency: Evaluate the relationship of self-esteem to work ethic						
Competency Objectives:						
7.10.01.01	Identify special characteristics and abilities in self and others	M	R	R	R	R
7.10.01.02	Identify internal and external factors that affect self-esteem	M	R	R	R	R
7.10.01.03	Identify how individual characteristics relate to achieving personal, social, educational, and career goals	M	R	R	R	R
7.10.01.04	Identify the relationship between personal behavior and self-concept	M	R	R	R	R
7.10.02 Competency: Analyze the relationship of personal values and goals to work ethic both in and out of the workplace						
Competency Objectives:						
7.10.02.01	Distinguish between values and goals	M	R	R	R	R
7.10.02.02	Determine the importance of values and goals	M	R	R	R	R
7.10.02.03	Evaluate how one's values affect one's goals	M	R	R	R	R
7.10.02.04	Identify own short- and long-term goals	M	R	R	R	R
7.10.02.05	Prioritize own short- and long-term goals	M	R	R	R	R
7.10.02.06	Identify how one's values are reflected in one's work ethic	M	R	R	R	R
7.10.02.07	Identify how interactions in the workplace affect one's work ethic	M	R	R	R	R
7.10.02.08	Identify how life changes affect one's work ethic	M	R	R	R	R
7.10.03 Competency: Demonstrate work ethic						
Competency Objectives:						
7.10.03.01	Examine factors that influence work ethic	M	R	R	R	R
7.10.03.02	Display initiative	R	R	R	R	R
7.10.03.03	Demonstrate dependable attendance and punctuality	R	R	R	R	R
7.10.03.04	Demonstrate organizational skills	R	R	R	R	R
7.10.03.05	Adhere to schedules and deadlines	R	R	R	R	R
7.10.03.06	Demonstrate a willingness to learn	R	R	R	R	R
7.10.03.07	Demonstrate a willingness to accept feedback and evaluation	R	R	R	R	R
7.10.03.08	Demonstrate interpersonal skills required for working with and for others	R	R	R	R	R
7.10.03.09	Describe appropriate employer-employee interactions for various situations	R	R	R	R	R

LEVEL		11	12	AD	WS	LL
7.10.03.10	Express feelings and ideas in an appropriate manner for the workplace	R	R	R	R	R
UNIT: 7.11 Job Seeking						
7.11.01 Competency: Prepare for employment						
Competency Objectives:						
7.11.01.01	Identify traditional and nontraditional employment sources	I	R	R	R	R
7.11.01.02	Utilize employment sources	I	R	R	R	R
7.11.01.03	Research job opportunities, including nontraditional careers	I	R	R	R	R
7.11.01.04	Interpret equal employment opportunity laws	I	R	R	R	R
7.11.01.05	Explain the critical importance of personal appearance, hygiene, and demeanor throughout the employment process	I	R	R	R	R
7.11.01.06	Prepare for generic employment tests and those specific to an occupation/organization	I	R	R	R	R
7.11.02 Competency: Develop a resume						
Competency Objectives:						
7.11.02.01	Identify personal strengths and weaknesses	I	M	R	R	R
7.11.02.02	List skills and/or abilities, career objective(s), accomplishments/achievements, educational background, work experience, volunteer/community contributions, and organizational memberships	I	M	R	R	R
7.11.02.03	Select an acceptable resume format	I	M	R	R	R
7.11.02.04	Use correct grammar and spelling and concise wording	M	R	R	R	R
7.11.02.05	Secure references	I	M	R	R	R
7.11.02.06	Complete the resume	I	M	R	R	R
7.11.03 Competency: Complete the job application process						
Competency Objectives:						
7.11.03.01	Explain the importance of an application form	I	M	R	R	R
7.11.03.02	Obtain the job application form	I	M	R	R	R
7.11.03.03	Demonstrate appropriate behaviors (e.g., personal appearance, hygiene, and demeanor) for obtaining job application forms in person	I	M	R	R	R
7.11.03.04	Describe methods for handling illegal questions on job application forms	I	M	R	R	R
7.11.03.05	Demonstrate legible written communication skills using correct grammar and spelling and concise wording	I	M	R	R	R
7.11.03.06	Return application to appropriate person	I	M	R	R	R
7.11.03.07	Request interview	I	M	R	R	R

LEVEL		11	12	AD	WS	LL
7.11.03.08	Follow up on application status	I	M	R	R	R
7.11.04 Competency: Demonstrate interviewing skills						
Competency Objectives:						
7.11.04.01	Investigate interview procedures	I	M	R	R	R
7.11.04.02	Demonstrate appropriate behaviors (e.g., appearance, hygiene, and demeanor) for the interview	I	M	R	R	R
7.11.04.03	Demonstrate question-and-answer techniques	I	M	R	R	R
7.11.04.04	Demonstrate methods for handling difficult and/or illegal interview questions	I	M	R	R	R
7.11.04.05	Use correct grammar and concise wording	I	M	R	R	R
7.11.05 Competency: Secure employment						
Competency Objectives:						
7.11.05.01	Identify present and future employment opportunities within an occupation/organization	I	M	R	R	R
7.11.05.02	Research the organization/company	I	M	R	R	R
7.11.05.03	Use follow-up techniques to enhance employment potential	I	M	R	R	R
7.11.05.04	Evaluate job offer(s)	I	R	M	R	R
7.11.05.05	Respond to job offer(s)	I	R	M	R	R
UNIT: 7.12 Job Retention and Career Advancement Skills						
7.12.01 Competency: Analyze the organizational structure of the workplace						
Competency Objectives:						
7.12.01.01	Identify employer expectations regarding job performance, work habits, attitudes, personal appearance, and hygiene	I	M	R	R	R
7.12.01.02	Comply with company policies and procedures	I	R	R	M	R
7.12.01.03	Examine the role/relationship between employee and employer	I	M	R	R	R
7.12.01.04	Recognize opportunities for advancement and reasons for termination	I	R	R	M	R
7.12.01.05	Recognize the organization's ethics	I	M	R	R	R
7.12.02 Competency: Maintain positive relations with others						
Competency Objectives:						
7.12.02.01	Exhibit appropriate work habits and attitudes	I	M	R	R	R
7.12.02.02	Identify behaviors for establishing successful working relationships	I	M	R	R	R
7.12.02.03	Cooperate through teamwork and group participation	M	R	R	R	R

LEVEL		11	12	AD	WS	LL
7.12.02.04	Demonstrate a willingness to compromise	M	R	R	R	R
7.12.02.05	Identify methods for dealing with harassment, bias, and discrimination based on race, color, national origin, gender, religion, disability, or age	M	R	R	R	R
7.12.02.06	Cooperate with authority	R	R	R	R	R
7.12.02.07	Accept supervision	R	R	R	R	R
7.12.03 Competency: Demonstrate accepted social and work behaviors						
Competency Objectives:						
7.12.03.01	Demonstrate a positive attitude	R	R	R	R	R
7.12.03.02	Demonstrate accepted conversation skills	R	R	R	R	R
7.12.03.03	Use good manners	R	R	R	R	R
7.12.03.04	Accept responsibility for assigned tasks	R	R	R	R	R
7.12.03.05	Demonstrate personal hygiene	R	R	R	R	R
7.12.03.06	Demonstrate knowledge of a position	R	R	R	R	R
7.12.03.07	Perform quality work	R	R	R	R	R
7.12.04 Competency: Analyze opportunities for personal and career growth*						
Competency Objectives:						
7.12.04.01	Determine opportunities within chosen occupation/organization	I	M	R	R	R
7.12.04.02	Determine other career opportunities outside chosen occupation/organization	I	M	R	R	R
7.12.04.03	Evaluate the factors involved in considering a new position within or outside an occupation/organization	I	M	R	R	R
7.12.04.04	Exhibit characteristics needed for advancement	I	R	R	M	R
UNIT: 7.13 Technology in the Workplace						
7.13.01 Competency: Demonstrate knowledge of technology issues						
Competency Objectives:						
7.13.01.01	Demonstrate knowledge of the characteristics of technology	R	R	R	R	R
7.13.01.02	Demonstrate knowledge of how technology systems are applied	R	R	R	R	R
7.13.01.03	Assess the impact of technology on the individual, society, and environment	R	R	R	R	R
7.13.01.04	Demonstrate knowledge of the evolution of technology	I	R	R	R	R
7.13.01.05	Identify how people, information, tools and machines, energy, capital, physical space, and time influence the selection and use of technology	R	R	R	R	R

LEVEL		11	12	AD	WS	LL
7.13.01.06	Identify legal and ethical issues related to technology (e.g., confidentiality, information sharing, copyright protection)	I	R	R	R	R
7.13.02 Competency: Demonstrate skills related to technology issues						
Competency Objectives:						
7.13.02.01	Exhibit willingness to adapt to technological change	R	R	R	R	R
7.13.02.02	Utilize technological systems	R	R	R	R	R
7.13.02.03	Utilize a variety of resources and processes to solve technological problems	R	R	R	R	R
7.13.02.04	Employ higher-order thinking skills for solving technological problems	R	R	R	R	R
7.13.02.05	Use technology in a safe and responsible manner	R	R	R	R	R
7.13.02.06	Apply science, mathematics, communication, and social studies concepts to solve technological problems	R	R	R	R	R
7.13.02.07	Demonstrate ingenuity and creativity in the use of technology	R	R	R	R	R
7.13.02.08	Utilize a formal method (systems approach) in solving technological problem*	R	R	R	R	R
UNIT: 7.14 Lifelong Learning						
7.14.01 Competency: Apply lifelong learning practices to individual situations						
Competency Objectives:						
7.14.01.01	Define lifelong learning	M	R	R	R	R
7.14.01.02	Identify factors that cause the need for lifelong learning	M	R	R	R	R
7.14.01.03	Identify changes that may require the retraining and upgrading of employee's skills	M	R	R	R	R
7.14.01.04	Identify avenues for lifelong learning	M	R	R	R	R
7.14.01.05	Participate in lifelong learning activities	M	R	R	R	R
7.14.02 Competency: Adapt to change						
Competency Objectives:						
7.14.02.01	Analyze the causes and effects of change	I	R	R	R	R
7.14.02.02	Identify the effect of change on goals	I	R	R	R	R
7.14.02.03	Identify the importance of flexibility when reevaluating goals	I	R	R	R	R
7.14.02.04	Evaluate the need for lifelong learning experiences in adapting to change	I	R	R	R	R

LEVEL		11	12	AD	WS	LL
UNIT: 7.15 Economic Education						
7 15.01 Competency: Analyze how an economy functions as a whole						
Competency Objectives:						
7.15.01.01	Describe how individuals and societies make choices to satisfy needs and wants with limited resources	I	R	R	R	R
7.15.01.02	Identify how production factors (land, labor, capital, and entrepreneurship) are used to produce goods and services	I	M	R	R	R
7.15.01.03	Illustrate how individuals and households exchange their resources for the income they use to buy goods and services	I	M	R	R	R
7.15.01.04	Explain how individuals and business firms use resources to produce goods and services to generate income	I	M	R	R	R
7.15.01.05	Identify characteristics of command, market, and traditional economies*	I	M	R	R	R
7.15.01.06	Describe how all levels of government assess taxes in order to provide services	I	M	R	R	R
7.15.02 Competency: Analyze how an economic system is a framework within which decisions are made by individuals and groups						
Competency Objectives:						
7.15.02.01	List several individuals and groups that make economic decisions at the local, state, and national levels	I	M	R	R	R
7.15.02.02	Identify the important roles that local, state, and national governments play in a market economy	I	M	R	R	R
7.15.02.03	List examples how government decisions affect individuals	I	M	R	R	R
7.15.02.04	Identify how geographic locations affect the political and economic systems of the world	I	M	R	R	R
7.15.02.05	Evaluate how markets allocate goods and services	I	M	R	R	R
7.15.02.06	Explain how resources, goods, and services are exchanged in markets	I	M	R	R	R
7.15.02.07	Explain competition and its effect on the market	I	M	R	R	R

LEVEL		11	12	AD	WS	LL
7.15.03 Competency: Analyze the importance of making informed personal financial decisions						
Competency Objectives:						
7.15.03.01	Describe the need for personal management records	I	M	R	R	R
7.15.03.02	Create a personal budget	I	M	R	R	R
7.15.03.03	Create a budget for a family of four for one month	I	M	R	R	R
7.15.03.04	Explain how credit affects personal/family finances	I	M	R	R	R
7.15.03.05	Identify steps to avoid credit problems	I	M	R	R	R
7.15.03.06	Make informed consumer choices in response to personal needs and wants	I	M	R	R	R
7.15.03.07	Identify factors that influence consumer decisions (e.g., advertisements, peer groups, price, and location)	I	M	R	R	R
7.15.03.08	Explain the costs and benefits for individuals of various types of taxation at the local, state, and federal levels	I	M	R	R	R
UNIT: 7.16 Balancing Work and Family						
7.16.01 Competency: Analyze the effects of family on work						
Competency Objectives:						
7.16.01.01	Recognize how family values, goals, and priorities are reflected in the workplace	I	M	R	R	R
7.16.01.02	Identify present and future family structures and responsibilities	I				
7.16.01.03	Describe personal and family roles	I	R	R	R	R
7.16.01.04	Analyze concerns of working parent(s)	I	M	R	R	R
7.16.01.05	Examine how family responsibilities can conflict with work	I	M	R	R	R
7.16.01.06	Identify ways to resolve family-related conflicts	I				
7.16.01.07	Explain how to use support systems/community resources to help resolve family-related conflicts	I				
7.16.02 Competency: Analyze the effects of work on family						
Competency Objectives:						
7.16.02.01	Identify responsibilities associated with paid and nonpaid work	I				
7.16.02.02	Compare the advantages and disadvantages of multiple incomes	I	R	R	R	R

LEVEL		11	12	AD	WS	LL
7.16.02.03	Explain how work can conflict with family responsibilities	I				
7.16.02.04	Explain how work-related stress can affect families	I	R			
7.16.02.05	Identify family support systems and resources	I				
UNIT: 7.17 Citizenship in the Workplace						
7.17.01 Competency: Exercise the rights and responsibilities of citizenship in the workplace						
Competency Objectives:						
7.17.01.01	Identify the basic rights and responsibilities of citizenship in the workplace	I				
7.17.01.02	Identify situations in which compromise is necessary	I	M			
7.17.01.03	Examine how individuals from various backgrounds contribute to the workplace	I				
7.17.01.04	Demonstrate initiative to facilitate cooperation	I	R			
7.17.01.05	Give/receive constructive criticism to enhance cooperation	I	R			
7.17.02 Competency: Prepare to work in a multicultural society						
Competency Objectives:						
7.17.02.01	Identify ways to live in a multicultural society with mutual respect and appreciation for others	I	R	R		
7.17.02.02	Examine how culture and experience create differences in people	I	R	R		
7.17.02.03	Demonstrate respect for the contributions made by all people	I	R	R		
7.17.02.04	Investigate personal cultural background as a means of developing self-respect	I	R	R		
7.17.02.05	Make personal choices that reduce discrimination, isolation, and prejudice	I	R	R		
7.17.02.06	Work effectively with people irrespective of their race, gender, religion, ethnicity, disability, age, or cultural background	I	R	R		
UNIT: 7.18 Leadership						
7.18.01 Competency: Evaluate leadership styles appropriate for the workplace						
Competency Objectives:						
7.18.01.01	Identify characteristics of effective leaders	I	R	R		
7.18.01.02	Compare leadership styles	I	R	R		
7.18.01.03	Demonstrate effective delegation skills	I	R	R		
7.18.01.04	Investigate empowerment concepts	I	R	R		

LEVEL		11	12	AD	WS	LL
7.18.01.05	Identify opportunities to lead in the workplace	I	R	R		
7.18.02 Competency: Demonstrate effective teamwork skills						
Competency Objectives:						
7.18.02.01	Identify the characteristics of a valuable team member	I	R	R		
7.18.02.02	Identify methods of involving each team member	I	M	R		
7.18.02.03	Contribute to team efficiency and success	I	M	R		
7.18.02.04	Determine ways to motivate team members	I	R	R		
7.18.03 Competency: Utilize effective communication skills						
Competency Objectives:						
7.18.03.01	Identify the importance of listening	I	R	R		
7.18.03.02	Demonstrate effective listening skills	I	R	R		
7.18.03.03	Demonstrate assertive communication techniques	I	R	R		
7.18.03.04	Recognize the importance of verbal and nonverbal cues and messages	I	R	R		
7.18.03.05	Prepare written material	I	R	R		
7.18.03.06	Analyze written material	I	R	R		
7.18.03.07	Give/receive feedback	I	R	R		
7.18.03.08	Communicate thoughts	I	R	R		
7.18.03.09	Use appropriate language	I	R	R		
7.18.03.10	Follow oral and written instructions	I	R	R		
7.18.03.11	Demonstrate effective telephone techniques	I	R	R		
7.18.03.12	Identify technology in communications	I	R	R		
UNIT: 7.19 Entrepreneurship						
7.19.01 Competency: Evaluate the role of small business						
Competency Objectives:						
7.19.01.01	Identify the impact of small business on the local economy	I	R	R		
7.19.01.02	Examine the relationship of small business to a national (USA) and global economy	I	R	R		
7.19.01.03	Identify factors that contribute to the success of small business	I	R	R		
7.19.01.04	Identify factors that contribute to the failure of small business	I	R	R		
7.19.01.05	Identify the components of a business plan	I	R	R		

LEVEL		11	12	AD	WS	LL
7.19.02 Competency: Examine entrepreneurship as a personal career option						
Competency Objectives:						
7.19.02.01	Evaluate personal interests and skills	I	R	R		
7.19.02.02	Compare personal interests and skills with those necessary the entrepreneurship	I	R	R		
7.19.02.03	Determine motives for becoming an entrepreneur	I	R	R		
7.19.02.04	Identify the advantages and disadvantages of owning a small business	I	R	R		
7.19.02.05	Compare business ownership to work for others	I	R	R		

Heart of Ohio Tech Prep Consortium
Engineering Technologies Core Model
Approved May 1997

PATHWAYS for

GRAPHIC COMMUNICATIONS TECHNOLOGY

ARTICULATED COLLEGE PROGRAMS:

1. Columbus State .... Graphic Communications Technology

NOTE: The chart on the next page illustrates the four-year proposed career pathway chart for a student in the Engineering Graphic Communications program. The chart highlights the recommended subjects for grades 9-12, prerequisites, suggested electives, an explanation of the Tech Prep block, high school and college exit occupations.

The pathway chart on pages 51-52 and the pathway narrative on page 53-54 were developed by the Heart of Ohio Tech Prep Consortium. The struck-out courses are taught as units during grades 11 and 12. The shaded courses are advanced skill courses that the student may gain during the college program. These charts are subject to change at the discretion of the college.

The units, competencies, and competency objectives starting on page 55 are the technical skills that have been identified for the Graphic Communication Tech Prep program through the Consortium and the Engineering Curriculum Steering Committee. These competencies and competency objectives were industry validated May, 1997.

Westerville Schools
Westerville North High School

1998

Engineering Core/
Graphics Communications
Engineering Technology

Heart of Ohio Tech Prep Consortium

9th Grade	Min.	10th Grade	Min.	11th Grade	Min	12th Grade	Min
TP Career Focus/ TP High Tech Systems I	50	Exploratory Computer Applications/	50	TP Engineering Core Graphics Communications Multimedia Algebra 2/Geometry* TP Field Experience	150	Social Studies	50
						Algebra 3/Pre-College Math	50
						Applied Language Arts	50
Keyboarding/Elective	50	TP High Tech Systems II	50				
English 9	50	English 10	50				
Phy. Ed./Social Studies	50	Social Studies/Fine Arts	50	English 11	50	TP Engineering Core Graphics Communications Physics	150
Algebra 1/Integrated 1	50	Geometry/Integrated 2	50	Social Studies	50		
Science	50	Elective	50	Chemistry	50		

Prerequisites for Grade 11 of Tech Prep: Passage of all parts of 9th grade proficiency test, Algetra 1/Integrated 1, Geometry/Integrated 2. Demonstration of the 10th grade communications competencies or the equilavent.

Prerequisites for college portion of Tech Prep: Articulation or proficiency testing will determine where students place into the program.

Suggested Electives: Photography (fine arts). Foreign language, Basic Keyboarding.

Explanation of Tech Prep Blocks: Students will be enrolled in a 150 min. Tech Prep block that will include one academic (science). Grade 11 core integrates technical and employability skills with Algebra 2 or an appropriate level of math. Grade 12 integrates occupational, employability skills with Physics. Other college prep academics will be taught outside the block.

High School Exit Occupations: Assistant Photographer, Beginning Drafter, CAD Operator, and Drafting Technician.

College Exit Occupations: (Based on AAS in Graphic Communications) Composition Assistant, Photoengraver Press Operator, Photographer, Computer Graphics Illustrator, Production Artist, Printing Estimator, Typesetter.

*Or appropriate math series

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Columbus State Community College **Spring 1997** **Engineering Technologies Core Model**

College Pathway: Graphic Communications

May 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
~~GRPH 112 Introduction to Computer Graphics~~	3	GRPH 125 Image Assembly	4	GRPH 130 Press Operations	3	~~GRPH 243 Computer Graphic Illustration~~	3	GRPH 251 Electronic Imaging	3	GRPH 140 Press Operations	3
GRPH 110 Survey of Graphic Communications	3	~~GRPH 122 Electronic Publishing~~	5	BMGT 101 Introduction to Business	5	GRPH 242 Lithographic Camera	3	GRPH 244 Quality Control in Graphic Commun.	4	HUM 1xx Humanities	5
~~GRPH 111 Black & White Photography~~	3	~~PHYS 100 Introduction to Physics~~	4	GRPH 131 Design & Typography	3	BMGT 111 Management	5	ACCT 101 Financial Accounting	4	**GRPH 282 Electronic Publishing II**	3
ENGL 101 Beginning Composition	3	ENGL 102 Essay & Research	3	GRPH 132 Paper & Ink	3	GRPH 241 Estimating		SSCI 10x Social & Behavioral Science	5	**GRPH 283 Multimedia Presentation Graphics**	3
MATH 103 Beginning Algebra II	4	NSCI 101 Natural Science I	5	COMM 105 Speech	3	ENGL 204 Technical Writing	3	**GRPH 281 Color Photography**	3		
	?					**GRPH 299 Special Topics in Graphic Communications**	3				

Struck-out courses = those that students may articulate or pass via proficiency testing.
Shaded courses = advanced skills added to the curriculum.

Heart of Ohio Tech Prep Consortium -- **Engineering Technologies Core Model** -- May 1997
Columbus State -- Graphic Communications Technology

HIGH SCHOOL EXIT OCCUPATIONS:

Assistant Photographer
Beginning Drafter
CAD Operator
Drafting Technician

COLLEGE EXIT OCCUPATIONS:

Composition Assistant
Photoengraver Press Operator
Photographer
Computer Graphics Illustrator
Production Artist
Printing Estimator
Typesetter

PREREQUISITES FOR COLLEGE PORTION OF TECH PREP:

No specific prerequisites. Articulation and/or proficiency testing will determine where students will enter the program. However, in order to follow the sequence as closely as possible, students should be computer literate and proficient in algebra and geometry. High school level chemistry and physics coursework is also strongly recommended. Finally, they should have mastered the competencies during high school that are relevant to the struckout college technical courses in the college pathway table.

SUGGESTED ELECTIVES:

N/A

ADVANCED SKILLS PORTION OF TECH PREP:

Shaded courses in the college pathway table represent the advanced skills portion of the program.

EXPLANATION OF TECH PREP COURSE DIFFERENCE:

Struckout courses in the college pathway table represent those that students may articulate or pass via proficiency testing. Shaded courses represent the advanced skills portion. A student must articulate or proficiency-test out of all struckout courses in order to complete the advances skills portion of the program within the maximum 110 credit hours.

HEART OF OHIO TECH PREP CONSORTIUM CURRICULUM PATHWAY NARRATIVE

Engineering Technologies Core Model, May 1997

Columbus State Community College
Graphic Communications Technology Pathway

In the space below, describe the systemic change at the postsecondary level and what new options will be available for Tech Prep college students (occupational, employability, and academic).

Systemic change that will occur in the Graphic Communications Technology program at Columbus State, as a result of the installation of Tech Prep pathways in the Heart of Ohio Tech Prep Consortium, include the following:

- Competencies offering additional breadth and depth to Tech Prep program completers will be possible at the postsecondary level as a result of students matriculating to Columbus State better prepared to engage in college-level work. This will help ensure that business and industry's expectations for qualified technicians and professionals are being met by increasing the time available to learn additional competencies that are being requested by employers. These competencies are represented by the pathway's advanced skills coursework (see the shaded cells in the college pathway table).

- Business and industry are seeking graduates that are broadly educated across disciplines as well as prepared specifically in the technical specialty. The Heart of Ohio Consortium's approach to designing Tech Prep models addresses these needs by prescribing cross-disciplinary, multi-disciplinary educational approaches throughout the curriculum, most intensely at the secondary level, but also occurring broadly in the postsecondary curriculum. This broad preparation optimizes program graduates' ability to be flexible, job-ready, and immediately productive upon completion of the Columbus State Tech Prep program. Graduates of the Tech Prep program are expected, as a result of their advanced skills, to enhance their employers' competitive edge in a period of rapid change in both technologies and markets.

Qualified secondary Tech Prep students in the program will have the opportunity to begin their college experience early through the use of Post-Secondary Enrollment Options. Tech Prep models define appropriate coursework or these students to ensure a seamless pathway through the model. In addition, Columbus State departments will actively seek ways to connect with the secondary programs, their teachers, and their students, through a variety of partnerships that may include (but not be limited to) demonstrations and career talks by college personnel at the high school sites, loan or donation of equipment, team teaching of certain competencies at the high school or college site, access for Tech Prep high school classes to college facilities and equipment, opportunities for high school Tech Prep teachers to participate in and/or audit relevant college technical courses (in some cases, tuition-free), field trips to the college for prospective and actual Tech Prep students, and the like. These partnerships extend the relationships of the high schools and the college well beyond their more usual, traditional interactions.

- Articulation agreements between the Consortium's Engineering Technologies Core model/Graphic Communications Career Major (grades 11-12) and Columbus State's Tech Prep Graphic Communications Technology program will be formalized in the coming year. This should clarify and enhance matriculation opportunities for secondary program completers into the postsecondary part of the Tech Prep model.

- Columbus State technical programs are regularly validated through ongoing business and industry surveys, as well as input from program advisory committees and adjunct faculty who are also actively employed in relevant industry organizations. Although Columbus State is confident that its Graphic Communications Technology program currently meets business and industry needs, the faculty and administration of the college acknowledge that some foundational competencies can be delivered within a collaboratively developed secondary curriculum. The development of this Tech Prep model provides Tech Prep college students with a unique opportunity to augment a solid associate degree with advanced skills coursework that is not currently included in the program requirements, but which offers enhanced value to both program graduates and their future employers.

UNIT: 7.30 Mechanical CAD Drafting

MECH 251

LEVEL		11	12	AD	WS	LL
7.30.01 Competency: Create 2-D orthographic drawings						
Competency Objectives:						
7.30.01.01	Create primitive drawing entities	M				
7.30.01.02	Draw utilizing absolute Cartesian coordinates	I	M			
7.30.01.03	Draw utilizing relative Cartesian coordinates	I	M			
7.30.01.04	Draw utilizing polar coordinates	I	M			
7.30.01.05	Draw using construction aides (e.g., snaps, grid, snap, etc.)					
7.30.01.06	Change drawing attributes		I	M		
7.30.01.07	Edit drawing entity properties (e.g., color, layer, thickness, linetype)	I	R	M		
7.30.01.08	Construct drawing entities (e.g., offset, timer, extend, break, mirror, etc.)	I	R	M		
7.30.01.09	Edit drawing entities (e.g., offset, timer, extend, break, mirror, etc.)	I	R	M		
7.30.01.10	Set system variables (e.g., units, scale)	M	R	R		
7.30.01.11	Use system variables	M	R	R		
7.30.01.12	Create layers	I	R	M		
7.30.01.13	Name layers	I	R	M		
7.30.01.14	Manipulate layers	I	R	M		
7.30.01.15	Save files	M				
7.30.01.16	Create back-ups	M				
7.30.01.17	Create hatches, patterns, symbols	I	R	M		
7.30.01.18	Recall drawing templates/block	I	R	M		
7.30.02 Competency: Annotate orthographic drawings						
Competency Objectives:						
7.30.02.01	Create text styles	I	R	M		
7.30.02.02	Edit text styles	I	R	M		
7.30.02.03	Select text styles	I	R	M		
7.30.02.04	Apply notes	I	R	M		
7.30.03 Competency: Dimension orthographic drawings						
Competency Objectives:						
7.30.03.01	Create dimensions	I	M			
7.30.03.02	Edit text	I	M			
7.30.03.03	Control dimension variables/models	I	M			

LEVEL		11	12	AD	WS	LL
7.30.04 Competency: Control display						
Competency Objectives:						
7.30.04.01	Apply view control while drawing (e.g., zoom and pan)	I	M			
7.30.04.02	Control view resolution (e.g., viewers)	I	M			
7.30.04.03	Save views	M	R			
7.30.04.04	Display views	M	R			
7.30.05 Competency: Extract entity and drawing information						
Competency Objectives:						
7.30.05.01	Measure distances	I	M			
7.30.05.02	Measure areas	I	M			
7.30.05.03	Identify locations	I	M			
7.30.05.04	List entity characteristics (e.g., length, size, location, properties, etc.)	M				
7.30.06 Competency: Manage symbols and attributes						
Competency Objectives:						
7.30.06.01	Create blocks and W-blocks/templates	I	R			
7.30.06.02	Create nested blocks/templates		I	M		
7.30.06.03	Insert blocks and drawings/templates	I	M			
7.30.06.04	Redefine blocks/templates		I	M		
7.30.06.05	Edit blocks/templates		I	M		
7.30.06.06	Apply attributes	I	M			
7.30.07 Competency: Create 2-D isometric drawings						
Competency Objectives:						
7.30.07.01	Manipulate snap and grid settings	M	R			
7.30.07.02	Toggle planes (e.g., left, right, top)	M	R			
7.30.07.03	Create text styles for each plane	I	M			
7.30.07.04	Create dimension styles		I	M		
7.30.07.05	Use dimension styles	I	M			
7.30.07.06	Create isometric ellipses		I	M		
7.30.08 Competency: Create script files						
Competency Objectives:						
7.30.08.01	Write a slide show script		I	M		
7.30.08.02	Write a script for setting initial variable settings		I	M		
7.30.08.03	Write a script for creating a title-block		I	M		

LEVEL		11	12	AD	WS	LL
7.30.09 Competency: Create custom linetypes						
Competency Objectives:						
7.30.09.01	Formulate a linetype composed of long dashes	I	M			
7.30.09.02	Formulate a linetype composed of lines, dashes and dots	I	M			
7.30.10 Competency: Apply advanced control display techniques						
Competency Objectives:						
7.30.10.01	Define camera viewpoints and angle of rotation	I	M			
7.30.10.02	Control display angle (e.g., d-view, v-point)	I	M			
7.30.11 Competency: Apply intermediate drafting skills						
Competency Objectives:		I	M			
7.30.11.01	Prepare sectional views	I	M			
7.30.11.02	Prepare auxiliary views	I	M			
7.30.11.03	Identify ANSI symbols	I	M			
7.30.11.04	Prepare views of drilled and tapped holes, counterbores, countersinks	I	M			
7.30.11.05	Identify a bill of materials	I	M			
7.30.11.06	Dimension drawings using ANSI 14.5 standards		I	M		
7.30.11.07	Describe purpose of auxiliary and sectional views		I	M		
7.30.11.08	Interpret reports and specifications		I	M		
7.30.11.09	Prepare pictorial drawings		I	M		
7.30.11.10	Prepare schematics		I	M		
7.30.11.11	Interpret basic pneumatic/hydraulic standard and symbols		I	M		
7.30.12 Competency: Interpret basic prints						
Competency Objectives:						
7.30.12.01	Visualize object from drawing	I	R			
7.30.12.02	Interpret orthographic projections	I	R			
7.30.12.03	Interpret sectional views	I	R			
7.30.12.04	Interpret detail and assembly drawings	I	R			
7.30.12.05	Interpret dimensions	I	R			
7.30.12.06	Interpret tolerances	I	R			

LEVEL		11	12	AD	WS	LL
7.30.13 Competency: Interpret intermediate prints						
Competency Objectives:						
7.30.13.01	Interpret screw thread specifications		I	R		
7.30.13.02	Interpret electrical, pneumatic/hydraulic drawings		I	R		
7.30.13.03	Interpret schematics		I	R		
7.30.14 Competency: Demonstrate knowledge of basic geometric dimensioning and tolerancing						
Competency Objectives:						
7.30.14.01	Identify geometric characteristics and symbols (i.e., flatness, straightness, roundness, cylindricity, profile of line, profile of surface, perpendicularly, angularity, parallelism, circular, runout, total indicated runout, position, concentricity, and symmetry)	I	R			
7.30.14.02	Define maximum material condition		I	R		
7.30.14.03	Define least material condition		I	R		
7.30.14.04	Define regardless of feature size condition		I	R		
7.30.14.05	Describe feature control blocks	I	R			
7.30.14.06	Describe datum surfaces and targets		I	R		
7.30.14.07	Define flatness (pitch)	M				
7.30.14.08	Define straightness (yaw)	M				
7.30.14.09	Define roundness	M				
7.30.14.10	Define cylindrically	M				
7.30.14.11	Define profile of line	M				
7.30.14.12	Define profile of surface	M				
7.30.14.13	Define perpendicularly	M				
7.30.14.14	Define angularity	I	M			
7.30.14.15	Define parallelism	I	M			
7.30.14.16	Define circular runout		I	M		
7.30.14.17	Define total runout		I	M		
7.30.14.18	Define true position concept to determine tolerance for location of holes in mating parts		I	M		
7.30.15 Competency: Demonstrate dimensioning techniques using CAD						
Competency Objectives:						
7.30.15.01	Construct arrowheads using various styles/disciplines	M				
7.30.15.02	Apply symbols for surface and texture control		I	M		

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LEVEL		11	12	AD	WS LL
7.30.15.03	Add labels/notes to drawing	I	M		
7.30.15.04	Interpret decimal tolerance dimensions	I	R		
7.30.15.05	Dimension arcs	M	R	R	
7.30.15.06	Dimension angles	M	R	R	
7.30.15.07	Dimension curves	I	R		
7.30.15.08	Dimension rounded-end shapes	I	R		
7.30.15.09	Dimension spherical objects	I	R		
7.30.15.10	Dimension cylindrical objects	I	R		
7.30.15.11	Dimension cones, pyramids, and prisms	I	R		
7.30.15.12	Dimension features on circular center line	I	R		
7.30.15.13	Dimension theoretical print of intersection		I	R	
7.30.15.14	Dimension object using rectangular coordinate system		I	R	
7.30.15.15	Dimension object using polar coordinate system	I	R		
7.30.15.16	Dimension object using tabular coordinate system	I	R		
7.30.15.17	Dimension object using ordinate dimensioning system	M	R		
7.30.16 Competency: Apply geometric dimensioning and tolerancing using CAD					
Competency Objectives:					
7.30.16.01	Interpret decimal tolerance dimensions	I	R		
7.30.16.02	Calculate clearance fit tolerances of mating parts	I	R		
7.30.16.03	Dimension clearance fit tolerances of mating parts	I	R		
7.30.16.04	Calculate interference fit tolerances of mating parts		I	R	
7.30.16.05	Dimension interference fit tolerances of mating parts		I	R	
7.30.16.06	Calculate tolerances to mating parts using standard fit tables		I	R	
7.30.16.07	Assign tolerances to mating parts using standard fit tables		I	R	
7.30.16.08	Apply positional and form tolerancing symbols	I	R		
7.30.16.09	Apply symbols for true position	I	R		
7.30.16.10	Apply symbols for maximum material control and regardless of feature size	I	R		
7.30.16.11	Calculate effects of dimensional stack-up	I	R		
7.30.16.12	Calculate transitional fit tolerances	I	R		
7.30.16.13	Dimension transitional fit tolerances	I	R		

LEVEL		11	12	AD	WS	LL
7.30.17 Competency: Prepare electrical/electronic CAD drawings						
Competency Objectives:						
7.30.17.01	Interpret basic electric/electronic standards and symbols	I	R			
7.30.17.02	prepare schematic drawings	I	R			
7.30.17.03	Prepare component drawings	I	R			
7.30.17.04	Prepare logic diagrams	I	R			
7.30.17.05	Prepare printed circuit board drawings	I	R			
7.30.17.06	Prepare wiring diagrams		I	R		
7.30.17.07	Prepare symbol library		I	R		
7.30.18 Competency: Prepare pneumatic/hydraulic CAD drawings						
Competency Objectives:						
7.30.18.01	Interpret basic pneumatic/hydraulic standards and symbols	I	R			
7.30.18.02	Prepare piping drawings	I	R			
7.30.18.03	Prepare isometric drawings	M	R			
7.30.18.04	Prepare graphical symbols	I	R			
7.30.18.05	Prepare pump and motor drawings	I	R			
7.30.18.06	Prepare cylinder and piston diagrams	I	R			
7.30.18.07	Prepare symbol library	I	R			
7.30.19 Competency: Create a product data management (PDM) system						
Competency Objectives:						
7.30.19.01	Develop a naming system for drawings	I	R			
7.30.19.02	Demonstrate the logical grouping of drawings within a set	M	R			
7.30.19.03	Develop a numbering system for a set of drawings	M	R			
7.30.19.04	Develop a method for tracking drawing revisions	M	R			
7.30.19.05	Develop a method for indicating a latest/final revision	M	R			

UNIT: 7.31 Black and White Photography

GRAPH 111

LEVEL		11	12	AD	WS	LL
7.31.01 Competency: Apply photographic techniques						
Competency Objectives:						
7.31.01.01	Identify and operate parts of a camera	M	R			
7.31.01.02	Identify and operate parts of an enlarger	M	R			
7.31.01.03	Expose and enlarge black and white photo paper	M	R			
7.31.01.04	Demonstrate knowledge of film chemistry	I	M			
7.31.01.05	Select enlarging papers	M	R			
7.31.01.06	Select and use contrast filters	I	M			
7.31.01.07	Burn and dodge prints	I	M			
7.31.01.08	Create photograms	M	R			
7.31.01.09	Produce proof sheets	M	R			
7.31.01.10	Operate on camera flash	I	M			
7.31.01.11	Operate an off camera flash	I	M			
7.31.01.12	Demonstrate use of various light meters	I	M			
7.31.01.13	Control shutter speed	M	R			
7.31.01.14	Control aperture	M	R			
7.31.01.15	Control file speed	M	R			
[illegible]31.01.16	Control lighting	M	R			
7.31.01.17	Utilize special effect filters	I	R			
7.31.02 Competency: Prepare photos for display						
Competency Objectives:						
7.31.02.01	Dry mount prints	I	M			
7.31.02.02	Spot tone prints	I	M			
7.31.02.03	Hand tint prints		M			
7.31.02.04	Sepia tone prints		M			
7.31.03 Competency: Apply composition techniques						
Competency Objectives:						
7.31.03.01	Apply rule of thirds	I	M			
7.31.03.02	Apply leading lines	I	M			
7.31.03.03	Apply repeated shapes or patterns	I	M			
7.31.03.04	Apply selective focus	M	R			
7.31.03.05	Apply depth of field	M	R			
7.31.03.06	Apply panning	M	R			
7.31.03.07	Apply framing	I	M			

LEVEL		11	12	AD	WS	LL
7.31.04 Competency: Describe the history of photography						
Competency Objectives:						
7.31.04.01	Identify the works by master photographers i.e., Ansel Adams, Alfred Stieglitz, Minor White, Margaret Bourke-White, Edward Weston, etc.	I	M			
7.31.04.02	Identify major advancements in the evolution of photography	I	M			

UNIT: 7.32 Introduction to Computer Graphics GRAPH 112						
LEVEL		**11**	**12**	**AD**	**WS**	**LL**
7.32.01 Competency: Operate desktop and find applications						
Competency Objectives:						
7.32.01.01	Load a floppy disk on CD	M	R	R	R	R
7.32.01.02	Name a floppy disk	M	R	R	R	R
7.32.01.03	Use the finder menu options	M	R	R	R	R
7.32.01.04	Move an identified item	M	R	R	R	R
7.32.02 Competency: Operate both mouse and keyboard equivalent commands						
Competency Objectives:						
7.32.02.01	Point, click and drag mouse for selecting and highlighting	M	R	R	R	R
7.32.02.02	Launch applications to open a document	M	R	R	R	R
7.32.02.03	Use key stroke commands to execute computer commands	M	R	R	R	R
7.32.02.04	Resize, move, zoom, scroll, save, and close document windows	M	R	R	R	R
7.32.03 Competency: Manipulate files						
Competency Objectives:						
7.32.03.01	Create files	M	R	R	R	R
7.32.03.02	Edit files	M	R	R	R	R
7.32.03.03	Store files	M	R	R	R	R
7.32.03.04	Retrieve files	M	R	R	R	R
7.32.04 Competency: Manipulate standard menu commands						
Competency Objectives:						
7.32.04.01	Select an application from the applications icon	M	R	R	R	R
7.32.04.02	Launch an application from the file icon and document icon	M	R	R	R	R
7.32.04.03	Open multiple document windows	M	R	R	R	R
7.32.04.04	Use menu bar commands, such as file, edit, view, insert, format, tools, window, and help	M	R	R	R	R

LEVEL		11	12	AD	WS	LL
7.32.05 Competency: Demonstrate basic working knowledge in software applications						
Competency Objectives:						
7.32.05.01	Perform spreadsheet functions	I	M	R	R	R
7.32.05.02	Apply word processing functions	M	R	R	R	R
7.32.05.03	Perform computer business graphics	I	M	R	R	R
7.32.05.04	Perform database functions	I	M	R	R	R
7.32.05.05	Use a drawing program	I	M	R	R	R
7.32.05.06	Use a paint program	I	M	R	R	R
7.32.05.07	Operate a electronic publishing program	I	M	R	R	R
7.32.05.08	Apply telecommunications functions	I	M	R	R	R
7.32.06 Competency: Manipulate laser printer output						
Competency Objectives:						
7.32.06.01	Load print driver software	I	M	R	R	R
7.32.06.02	Load paper and printer cartridges	I	M	R	R	R
7.32.06.03	Print a document	M	R	R	R	R
7.32.07 Competency: Demonstrate a minimum standard of keyboard proficiency						
Competency Objectives:						
7.32.07.01	Keyboard at 30 wpm using the touch method	I	M	R	R	R
7.32.07.02	Use a self-paced keyboarding training software	I	M	R	R	R
7.32.08 Competency: Use an industry-application of computer graphics						
Competency Objectives:						
7.32.08.01	Produce graphs, tables, and charts to communicate ideas	I	M	R	R	R
7.32.08.02	Construct and design layouts	I	M	R	R	R
7.32.08.03	Prepare layout of a document according to lab procedures	I	M	R	R	R

UNIT: 7.33 Electronic Publishing

GRPH 122

LEVEL		11	12	AD	WS	LL
7.33.01 Competency: Demonstrate proper launching of the electronic publishing software application						
Competency Objectives:						
7.33.01.01	Open the software application from the original folder	M	R	R	R	R
7.33.01.02	Open the application from the startup folder	M	R	R	R	R
7.33.01.03	Open the application from the desktop	M	R	R	R	R
7.33.01.04	Open the application from the apple menu	M	R	R	R	R
7.33.02 Competency: Create new electronic publishing documents						
Competency Objectives:						
7.33.02.01	Create text items	M	R	R	R	R
7.33.02.02	Create drawings and pictures	M	R	R	R	R
7.33.02.03	Create line elements	M	R	R	R	R
7.33.02.04	Group elements	M	R	R	R	R
7.33.03 Competency: Import elements into a electronic publishing document						
Competency Objectives:						
7.33.03.01	Import text into the document	M	R	R	R	R
7.33.03.02	Import graphic images into the document	M	R	R	R	R
7.33.04 Competency: Manipulate text materials for use in high-quality typographic documents						
Competency Objectives:						
7.33.04.01	Use electronic publishing capabilities to create text material	M	R	R	R	R
7.33.04.02	Use electronic publishing capabilities to edit text material	M	R	R	R	R
7.33.04.03	Use electronic publishing capabilities to manipulate text material on a page layout in terms of size, location, rotation, grouping, etc.	I	M	R	R	R
7.33.04.04	Use electronic publishing capabilities to ensure high-quality reproduction of text material	I	M	R	R	R
7.33.05 Competency: Manipulate picture and graphic material						
Competency Objectives:						
7.33.05.01	Use tools in a tool/box to size a picture and graphic	I	M	R	R	R
7.33.05.02	Use tools in a tool/box to rotate a picture and graphic	I	M	R	R	R
7.33.05.03	Use tools in a tool/box to stretch a picture and graphic	I	M	R	R	R
7.33.05.04	Use tools in a tool/box to alter contrast a picture and graphic	I	M	R	R	R
7.33.05.05	Use tools in a tool/box to color a picture and graphic	I	M	R	R	R

LEVEL		11	12	AD	WS	LL
7.33.06 Competency: Manipulate document and background (master) page elements						
Competency Objectives:						
7.33.06.01	Set up document page elements	I	M	R	R	R
7.33.06.02	Set up background page elements	I	M	R	R	R
7.33.06.03	Change master page elements	I	M	R	R	R
7.33.07 Competency: Demonstrate use of floating palettes and menu options						
Competency Objectives:						
7.33.07.01	Use draw tools	M	R	R	R	R
7.33.07.02	Add, format, edit, change, move, copy, and import text	M	R	R	R	R
7.33.07.03	Add, format, edit, change, move, copy, and import tables	I	M	R	R	R
7.33.07.04	Add, change, move, copy, import, and delete pictures	M	R	R	R	R
7.33.07.05	Add, change, rotate, flip word art	I	M	R	R	R
7.33.07.06	Use borders	M	R	R	R	R
7.33.07.07	Fill and shape frames	M	R	R	R	R
7.33.07.08	Apply links with other applications	I	M	R	R	R
7.33.08 Competency: Perform save, open, and print operations						
Competency Objectives:						
7.33.08.01	Save information with a document	M	R	R	R	R
7.33.08.02	Save the entire document	M	R	R	R	R
7.33.08.03	Open information within a document	M	R	R	R	R
7.33.08.04	Print information from within a document	M	R	R	R	R
7.33.08.05	Print the entire document	M	R	R	R	R

UNIT: 7.34 Computer Graphic Illustration

GRPH 243

LEVEL		11	12	AD	WS	LL
7.34.01 Competency: Demonstrate an understanding of the impact of computer graphic illustration technology						
Competency Objectives:						
7.34.01.01	Describe the debut of computer graphic illustration (historical perspective)	I	R	R	R	R
7.34.01.02	Define artistic freedom	I	R	R	R	R
7.34.01.03	Describe the impact of computer graphic illustration on artistic freedom	I	R	R	R	R
7.34.01.04	Discuss the "power" of the personal computer as it affects individual users, the graphic communications industry, and society in general	I	R	R	R	R

LEVEL		11	12	AD	WS	LL
7.34.02 Competency: Demonstrate use of terms, tools, and menus of graphic illustrator software						
Competency Objectives:						
7.34.02.01	Identify the basic operations and operating terms for use of graphic illustration software	M	R	R	R	R
7.34.02.02	Identify basic typographic conventions	M	R	R	R	R
7.34.02.03	Identify the available tool slots in the toolbox	M	R	R	R	R
7.34.02.04	Demonstrate basic uses of tools in the toolbox	M	R	R	R	R
7.34.02.05	Identify basic menus and commands, including outline apple, file, edit, arrange, view, paint, type, window, and graph menus	M	R	R	R	R
7.34.02.06	Demonstrate basic uses of menus and commands	M	R	R	R	R
7.34.02.07	Perform shortcuts using dialog boxes	M	R	R	R	R
7.34.03 Competency: Perform basic procedures for creating and saving graphic illustrations						
Competency Objectives:						
7.34.03.01	Create an illustration using tracing templates	I	M	R	R	R
7.34.03.02	Open an existing file inside graphic illustrator software	I	M	R	R	R
7.34.03.03	Create a two-page layout in the illustration window	M	R	R	R	R
7.34.03.04	Demonstrate how to set references by changing preference settings	I	M	R	R	R
7.34.03.05	Demonstrate drawing with objects by determining a path	M	R	R	R	R
7.34.03.06	Save an illustration by replacing an existing file	M	R	R	R	R
7.34.03.07	Finish an illustration by closing the file	M	R	R	R	R
7.34.04 Competency: Demonstrate original (no template) drawing paths						
Competency Objectives:						
7.34.04.01	Draw a rectangle and ellipse and create a geometric path at an angle	I	M	R	R	R
7.34.04.02	Extend a line by applying the freehand tool	I	M	R	R	R
7.34.04.03	Demonstrate Bexjier paths by drawing straight segments, perpendicular segments and cumed, and create a cusp	I	M	R	R	R
7.34.05 Competency: Trace bitmapped images						
Competency Objectives:						
7.34.05.01	Perform automated tracing by tracing a portion of an image	M	R	R	R	R
7.34.05.02	Convert a bitmapped image and edit a converted illustration	M	R	R	R	R
7.34.06 Competency: Reshape existing paths						
Competency Objectives:						
7.34.06.01	Select all elements	M	R	R	R	R
7.34.06.02	Deselect individual elements	M	R	R	R	R
7.34.06.03	Reshape geometric paths	M	R	R	R	R

LEVEL		11	12	AD	WS	LL
7.34.06.04	Demonstrate moving of elements by dragging a segment and measuring a move	I	M	R	R	R
7.34.06.05	Add and delete elements and convert points	I	M	R	R	R
7.34.06.06	Join endpoints and split elements	I	M	R	R	R
7.34.06.07	Demonstrate averaging of points by averaging along a rotated axis	I	M	R	R	R
7.34.07 Competency: Demonstrate preparation of type						
Competency Objectives:						
7.34.07.01	Create text objects, including point, area, and path text	I	M	R	R	R
7.34.07.02	Import text into columns	I	M	R	R	R
7.34.07.03	Demonstrate adjustment of area text by deleting and unlinking a text block	I	M	R	R	R
7.34.07.04	Format text by selecting and editing text	M	R	R	R	R
7.34.07.05	Perform text wrap around graphics by adjusting standoff and unwrapping text blocks	I	M	R	R	R
7.34.08 Competency: Perform fills of graphic objects						
Competency Objectives:						
7.34.08.01	Explain how fill affects a graphic object	I	M	R	R	R
7.34.08.02	Color (paint) a fill	M	R	R	R	R
7.34.08.03	Create a title pattern	M	R	R	R	R
7.34.08.04	Create clipping paths and multiple masks		I	M	R	R
7.34.08.05	Create compound paths and texts (make holes)		I	M	R	R
7.34.08.06	Discuss filling theory		I	M	R	R
7.34.08.07	Demonstrate filling	I	M	R	R	R
7.34.09 Competency: Demonstrate transforming and duplication of graphic objects						
Competency Objectives:						
7.34.09.01	Distinguish groups from nongroups	I	M	R	R	R
7.34.09.02	Control movement of graphic objects by creating, manipulating, and converting guides to objects	I	M	R	R	R
7.34.09.03	Protect objects by locking, unlocking, hiding, and showing objects	M	R	R	R	R
7.34.09.04	Demonstrate scaling an object by scaling a clone using the scale-dialog tool	M	R	R	R	
7.34.09.05	Flip objects using the relevant tools	M	R	R	R	
7.34.09.06	Demonstrate object rotation by using rotate-dialog and shear-dialog tools	M	R	R	R	
7.34.09.07	Demonstrate object transformation by transforming rotated objects	I	M	R	R	R
7.34.09.08	Demonstrate object duplication by duplicating a transformation	M	R	R	R	R
7.34.09.09	Demonstrate layering of objects by layering combined objects	M	R	R	R	R

LEVEL		11	12	AD	WS	LL
7.34.09.10	Demonstrate blending of objects by blending multiple paths	I	M	R	R	R
7.34.10 Competency: Perform creation and manipulation of graphics						
Competency Objectives:						
7.34.10.01	Create a graph by applying data to bar, pie, and area charts	I	M	R	R	R
7.34.10.02	Edit a graph to customize it	I	M	R	R	R
7.34.10.03	Apply graph designs to a bar and line chart	I	M	R	R	R
7.34.10.04	Import graphics by placing EPS (Encapsulated Postscript) graphics and opening the illustration	I	M	R	R	R
7.34.10.05	Export an illustration by saving the illustration in EPS format	I	M	R	R	R
7.34.10.06	Convert drawing into illustrations by applying the drawover utility	I	M	R	R	R
7.34.11 Competency: Operate peripheral graphic and text devices						
Competency Objectives:						
7.34.11.01	Operate a graphic tablet	I	M	R	R	R
7.34.11.02	Use a video camera to create graphic files	I	M	R	R	R
7.34.11.03	Use a scanner to create graphic files	I	M	R	R	R
7.34.12 Competency: Print illustrations						
Competency Objectives:						
7.34.12.01	Choose a printer	M	R	R	R	R
7.34.12.02	Set up a page to print	M	R	R	R	R
7.34.12.03	Adjust page sizes for printing	M	R	R	R	R
7.34.12.04	Create crop marks for printing oversized documents	M	R	R	R	R
7.34.12.05	Print oversized documents	M	R	R	R	R

Heart of Ohio Tech Prep Consortium
Engineering Technologies Core Model
Approved May 1997

PATHWAYS for

ELECTRONICS ENGINEERING TECHNOLOGY

ARTICULATED COLLEGE PROGRAMS:

1. Columbus State	Electronic Engineering Technology
2. Ohio University - Lancaster	Electronics Technology

NOTE: The chart on the next page illustrates the four-year proposed career pathway chart for a student in the Electronics Engineering program. The chart highlights the recommended subjects for grades 9-12, prerequisites, suggested electives, an explanation of the Tech Prep block, high school and college exit occupations.

The pathway chart on pages 72-73 and the pathway narrative on page 74-75 were developed by the Heart of Ohio Tech Prep Consortium. The struck-out courses are taught as units during grades 11 and 12. The shaded courses are advanced skills that the student may gain during the college program. The charts on pages 76-77 were developed by Ohio University—Lancaster, illustrating the post-secondary portion of the program. These charts are subject to change at the discretion of the colleges.

The competencies and competency objectives are the technical skills for Electronics Engineering Tech Prep program that have been identified through the Consortium and the Engineering Curriculum Steering Committee. These competencies and competency objectives were industry validated May, 1997.

Westerville Schools
Westerville South High School

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Engineering Core/
Electronics Engineering Technology

Heart of Ohio Tech Prep Consortium

9th Grade	Min.	10th Grade	Min.	11th Grade	Min	12th Grade	Min
TP Career Focus/ TP High Tech Systems I	50	Exploratory Computer Applications/ TP High Tech Systems II	50	TP Engineering Core Electronics Engineering Technology Algebra 2*	150	Social Studies/Elective	50
Keyboarding/Elective	50					Algebra 3/Pre-College Math	50
						Senior English Course	50
English 9	50	English 10	50	TP Field Experience		TP Engineering Core Electronics Engineering Technology	100
Phy. Ed./Health	50	Social Studies	50	English 11	50		
Algebra 1/Integrated 1	50	Geometry/Integrated 2	50	Social Studies	50		
Science	50	Fine Arts	50	Chemistry	50	Physics	50

Prerequisites for Grade 11 of Tech Prep: Passage of all parts of 9th grade proficiency test, Algebra 1.

Prerequisites for college portion of Tech Prep: Articulation or proficiency testing will determine where students place into the program.

Suggested Electives: Photography (fine arts).

Explanation of Tech Prep Blocks: Students will be enrolled in a 150 min. Tech Prep block that will include one academic (math/science). Grade 11 integrates occupational, employability skills with Algebra 2*. Grade 12 integrates occupational, employability skills with Physics.
Other college prep academics will be taught outside the block.
Post-Secondary Enrollment Option (PSEO) is an option during the 12th grade.

High School Exit Occupations: Beginning Drafter, CAD Operator, Drafting Technician, Component Assembler, Electronics Technician. Salesperson.

College Exit Occupations: Electronics Service Technician, Assistant Manufacturing Engineer, Avionics Technician/Supervisor, Engineering Technician, Test Technician, Product Technical Specialist. Junior Engineer, Electrical Technologist, Instrumentation Technician, Computer Maintenance Technician, Field Service Engineer, Salesperson, Industrial Maintenance Technician, and Data Communication Technician.

*Or an appropriate math series.

Columbus State Community College **Spring 1997** **Engineering Technologies Core Model**

College Pathway: Electronic Engineering Technology
May 1997

Heart of Ohio Tech Prep Consortium

1st Qtr.	Cr.	2nd Qtr.	Cr.	3rd Qtr.	Cr.	4th Qtr.	Cr.	5th Qtr.	Cr.	6th Qtr.	Cr.
ENGL 101 Beginning Composition	3	ENGL 102 Essay & Research	3	ENGL 204 Technical Writing	3	EET 250 Electronic Communications	4	EET 254 Electronics Fabrication	2	EET 2XX Technical Elective	3
~~MATH 111 Technical Mathematics I~~	4	PHYS 177 Tech Physics (Mechanics)	4	MATH 151 Calculus & Analytic Geometry I	5	EET 251 Electronic Communications Laboratory	2	EET 260 Industrial Electronics	4	EET 262 Digital Communications & Telecommunucations	3
~~EET 110 Electronic Drafting~~	2	MATH 113 Technical Mathematics III	4	EET 241Electronic Devices Circuit Analysis	4	MATH 152 Calculus & Analytic Geometry II	5	EET 261 Industrial Electronics Laboratory	2	EET 264 Fiberoptic Communications	3
~~EET 111 DC Fundamentals~~	4	EET 130 Electronic Devices	4	EET 242 Electronic Device Circuit Analysis Lab	2	EET 252 Microprocessors	4	SSCI 101, 102, 103, OR 104 (select one)	5	EET 255 Instrumentation & Controls	3
~~EET 112 DC Laboratory~~	2	EET 131 Electronic Devices Laboratory	2	EET 243 Digital Devices	4	EET 253 Microprocessor Laboratory	2	~~EET 144 PC Hardware~~	3	HUM 111, 112, 113, 151, o4 152 (select one)	5
MATH 112 Technical Mathematics II	4	EET 132 Digital Fundamentals	3	EET 244 Digital Devices Laboratory	2	PHYS 178 Technical Physics (Heat/Light/Sound)	4				
EET 120 AC Fundamentals	4	COMM 105 Speech	3								
EET 121 AC Laboratory	2										

Struck out courses – those that students may articulate or pass via proficiency testing.
Shaded courses = advanced skills added to the curriculum.

Heart of Ohio Tech Prep Consortium -- **Engineering Technologies Core Model** -- May 1997
Columbus State -- Electronic Engineering Technology

HIGH SCHOOL EXIT OCCUPATIONS:

Component Assembler
Electronics Technician
Salesperson

COLLEGE EXIT OCCUPATIONS:

Electronics Service Technician
Assistant Manufacturing Engineer
Avionics Technician/Supervisor
Engineering Technician
Test Technician
Product Technical Specialist

PREREQUISITES FOR COLLEGE PORTION OF TECH PREP:

No specific prerequisites. Articulation and/or proficiency testing will determine where students will enter the program. However, in order to follow the sequence as closely as possible, students should be computer literate and proficient in algebra and geometry. High school level chemistry and physics coursework is also strongly recommended. Finally, they should have mastered the competencies during high school that are relevant to the struckout college technical courses in the college pathway table.

SUGGESTED ELECTIVES:

N/A

ADVANCED SKILLS PORTION OF TECH PREP:

Shaded courses in the college pathway table represent the advanced skills portion of the program.

EXPLANATION OF TECH PREP COURSE DIFFERENCE:

Struckout courses in the college pathway table represent those that students may articulate or pass via proficiency testing. Shaded courses represent the advanced skills portion. A student must articulate or proficiency test out of all struckout courses in order to complete the advanced skills portion of the program within the maximum 110 credit hours.

HEART OF OHIO TECH PREP CONSORTIUM
CURRICULUM PATHWAY NARRATIVE

Engineering Technologies Core Model, May 1997

Columbus State Community College
Electronic Engineering Technology Pathway

In the space below, describe the systemic change at the postsecondary level and what new options will be available for Tech Prep college students (occupational, employability, and academic).

Systemic change that will occur in the Electronic Engineering Technology program at Columbus State, as a result of the installation of Tech Prep pathways in the Heart of Ohio Tech Prep Consortium, include the following:

- Competencies offering additional breadth and depth to Tech Prep program completers will be possible at the postsecondary level as a result of students matriculating to Columbus State better prepared to engage in college-level work. This will help ensure that business and industry's expectations for qualified technicians and professionals are being met by increasing the time available to learn additional competencies that are being requested by employers. These competencies are represented by the pathway's advanced skills coursework (see the shaded cells in the college pathway table).

- Business and industry are seeking graduates that are broadly educated across disciplines as well as prepared specifically in the technical specialty. The Heart of Ohio Consortium's approach to designing Tech Prep models addresses these needs by prescribing cross-disciplinary, multi-disciplinary educational approaches throughout the curriculum, most intensely at the secondary level, but also occurring broadly in the postsecondary curriculum. This broad preparation optimizes program graduates' ability to be flexible, job-ready, and immediately productive upon completion of the Columbus State Tech Prep program. Graduates of the Tech Prep program are expected, as a result of their advanced skills, to enhance their employers' competitive edge in a period of rapid change in both technologies and markets.

- Qualified secondary Tech Prep students in the program will have the opportunity to begin their college experience early through the use of Post-Secondary Enrollment Options. Tech Prep models define appropriate coursework or these students to ensure a seamless pathway through the model. In addition, Columbus State departments will actively seek ways to connect with the secondary programs, their teachers, and their students, through a variety of partnerships that may include (but not be limited to) demonstrations and career talks by college personnel at the high school sites, loan or donation of equipment, team teaching of certain competencies at the high school or college site, access for Tech Prep high school classes to college facilities and equipment, opportunities for high school Tech Prep teachers to participate in and/or audit relevant college technical courses (in some cases, tuition-free), field trips to the college for prospective and actual Tech Prep students, and the like. These partnerships extend the relationships of the high schools and the college well beyond their more usual, traditional interactions.

- Articulation agreements between the Consortium's Engineering Technologies Core model/Electronics Engineering Technology Career Major (grades 11-12) and Columbus State's Tech Prep Electronic Engineering Technology program will be formalized in the coming year. This should clarify and enhance matriculation opportunities for secondary program completers into the postsecondary part of the Tech Prep model.

- Columbus State technical programs are regularly validated through ongoing business and industry surveys, as well as input from program advisory committees and adjunct faculty who are also actively employed in relevant industry organizations. Although Columbus State is confident that its Electronic Engineering Technology program currently meets business and industry needs, the faculty and administration of the college acknowledge that some foundational competencies can be delivered within a collaboratively developed secondary curriculum. The development of this Tech Prep model provides Tech Prep college students with a unique opportunity to augment a solid associate degree with advanced skills coursework that is not currently included in the program requirements, but which offers enhanced value to both program graduates and their future employers.

OHIO UNIVERSITY - LANCASTER 1997-98 ELECTRONICS TECHNOLOGY (A.A.S.)

HEART OF OHIO TECH PREP CONSORTIUM

Freshman Year Sequence

Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
ETCH 110 - Basic Electronics	4	ETCH 111 - A.C. And D.C. Circuit Analysis	4	ETCH 112 - Industrial Electronics	4
IT 101 - Engineering Drawing	3	BA 101 - Business and It's Environment or ECON 103 - Principles of Microeconomics	4	ETCH 120 - Digital Electronics	4
IT 115 - Metal Fabrication	3	MATH 115 - Pre-Calculus or MATH 118 - Elementary Applied Mathematics	4 or 5	INCO 103 - Public Speaking	4
MATH 113 - Algebra	5	PSY 101 - General Psychology	5	MATH 163A - Introduction to Calculus or MATH 263A - Analytic Geometry and Calculus	4
TOTAL Credit Hours	15		17 or 18		16

Sophomore Year Sequence

Fall Quarter	Cr	Winter Quarter	Cr	Spring Quarter	Cr
ETCH 220 - Electrical Motors, Control Circuits, and Computers	4	ETCH 260 - Data Communications	4	ENG 151 - Freshman Composition	5
ETCH 236A - Microprocessor & Computer Basics	4	ETCH 221A - Programmable Controllers, Instrumentation & Process Control	4	ETCH 221B - Continuation of 221A	4
PHYS 201 - Introduction to Physics	4	ETCH 236B - Microprocessor & Computer Interfacing	4	ETCH 288 - Personal Computer Maintenance	4
ETCH 289 - Electronic Trouble-Shooting & Repair	4	PHYS 202 - Introduction to Physics	4	Elective	1 to 3
Elective	1 to 3				
TOTAL Credit Hours	17 to 20		16		14 to 16

ELECTRONICS TECHNOLOGY

HIGH SCHOOL EXIT TITLES

Component Assembler
Electronics Technician
Salesperson

A.A.S. DEGREE JOB TITLES

Junior Engineer
Electrical Technologist
Instrumentation Technician
Computer Maintenance Technician
Field Service Engineer
Salesperson
Industrial Maintenance Technician

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UNIT: 7.60 Mechanical CAD Drafting MECH 251					
LEVEL		11	12	AD	WS LL
7.60.01 Competency: Create 2-D orthographic drawings					
Competency Objectives:					
7.60.01.01	Create primitive drawing entities	M			
7.60.01.02	Draw utilizing absolute Cartesian coordinates	I	M		
7.60.01.03	Draw utilizing relative Cartesian coordinates	I	M		
7.60.01.04	Draw utilizing polar coordinates	I	M		
7.60.01.05	Draw using construction aides (e.g., snaps, grid, snap, etc.)				
7.60.01.06	Change drawing attributes		I	M	
7.60.01.07	Edit drawing entity properties (e.g., color, layer, thickness, linetype)	I	R	M	
7.60.01.08	Construct drawing entities (e.g., offset, timer, extend, break, mirror, etc.)	I	R	M	
7.60.01.09	Edit drawing entities (e.g., offset, timer, extend, break, mirror, etc.)	I	R	M	
7.60.01.10	Set system variables (e.g., units, scale)	M	R	R	
7.60.01.11	Use system variables	M	R	R	
7.60.01.12	Create layers	I	R	M	
7.60.01.13	Name layers	I	R	M	
7.60.01.14	Manipulate layers	I	R	M	
7.60.01.15	Save files	M			
7.60.01.16	Create back-ups	M			
7.60.01.17	Create hatches, patterns, symbols	I	R	M	
7.60.01.18	Recall drawing templates/block	I	R	M	
7.60.02 Competency: Annotate orthographic drawings					
Competency Objectives:					
7.60.02.01	Create text styles	I	R	M	
7.60.02.02	Edit text styles	I	R	M	
7.60.02.03	Select text styles	I	R	M	
7.60.02.04	Apply notes	I	R	M	
7.60.03 Competency: Dimension orthographic drawings					
Competency Objectives:					
7.60.03.01	Create dimensions	I	M		
7.60.03.02	Edit text	I	M		
7.60.03.03	Control dimension variables/models	I	M		

LEVEL		11	12	AD	WS LL
7.60.04 Competency: Control display					
Competency Objectives:					
7.60.04.01	Apply view control while drawing (e.g., zoom and pan)	I	M		
7.60.04.02	Control view resolution (e.g., viewers)	I	M		
7.60.04.03	Save views	M	R		
7.60.04.04	Display views	M	R		
7.60.05 Competency: Extract entity and drawing information					
Competency Objectives:					
7.60.05.01	Measure distances	I	M		
7.60.05.02	Measure areas	I	M		
7.60.05.03	Identify locations	I	M		
7.60.05.04	List entity characteristics (e.g., length, size, location, properties, etc.)	M			
7.60.06 Competency: Manage symbols and attributes					
Competency Objectives:					
7.60.06.01	Create blocks and W-blocks/templates	I	R		
7.60.06.02	Create nested blocks/templates		I	M	
7.60.06.03	Insert blocks and drawings/templates	I	M		
7.60.06.04	Redefine blocks/templates		I	M	
7.60.06.05	Edit blocks/templates		I	M	
7.60.06.06	Apply attributes	I	M		
7.60.07 Competency: Create 2-D isometric drawings					
Competency Objectives:					
7.60.07.01	Manipulate snap and grid settings	M	R		
7.60.07.02	Toggle planes (e.g., left, right, top)	M	R		
7.60.07.03	Create text styles for each plane	I	M		
7.60.07.04	Create dimension styles		I	M	
7.60.07.05	Use dimension styles	I	M		
7.60.07.06	Create isometric ellipses		I	M	
7.60.08 Competency: Create script files					
Competency Objectives:					
7.60.08.01	Write a slide show script		I	M	
7.60.08.02	Write a script for setting initial variable settings		I	M	
7.60.08.03	Write a script for creating a title-block		I	M	

LEVEL		11	12	AD	WS	LL
7.60.09 Competency: Create custom linetypes						
Competency Objectives:						
7.60.09.01	Formulate a linetype composed of long dashes	I	M			
7.60.09.02	Formulate a linetype composed of lines, dashes and dots	I	M			
7.60.10 Competency: Apply advanced control display techniques						
Competency Objectives:						
7.60.10.01	Define camera viewpoints and angle of rotation	I	M			
7.60.10.02	Control display angle (e.g., d-view, v-point)	I	M			
7.60.11 Competency: Apply intermediate drafting skills						
Competency Objectives:		I	M			
7.60.11.01	Prepare sectional views	I	M			
7.60.11.02	Prepare auxiliary views	I	M			
7.60.11.03	Identify ANSI symbols	I	M			
7.60.11.04	Prepare views of drilled and tapped holes, counterbores, countersinks	I	M			
7.60.11.05	Identify a bill of materials	I	M			
7.60.11.06	Dimension drawings using ANSI 14.5 standards		I	M		
7.60.11.07	Describe purpose of auxiliary and sectional views		I	M		
7.60.11.08	Interpret reports and specifications		I	M		
7.60.11.09	Prepare pictorial drawings		I	M		
7.60.11.10	Prepare schematics		I	M		
7.60.11.11	Interpret basic pneumatic/hydraulic standard and symbols		I	M		
7.60.12 Competency: Interpret basic prints						
Competency Objectives:						
7.60.12.01	Visualize object from drawing	I	R			
7.60.12.02	Interpret orthographic projections	I	R			
7.60.12.03	Interpret sectional views	I	R			
7.60.12.04	Interpret detail and assembly drawings	I	R			
7.60.12.05	Interpret dimensions	I	R			
7.60.12.06	Interpret tolerances	I	R			

LEVEL		11	12	AD	WS	LL
7.60.13 Competency: Interpret intermediate prints						
Competency Objectives:						
7.60.13.01	Interpret screw thread specifications		I	R		
7.60.13.02	Interpret electrical, pneumatic/hydraulic drawings	I	M	R		
7.60.13.03	Interpret schematics	I	M	R		
7.60.14 Competency: Demonstrate knowledge of basic geometric dimensioning and tolerancing						
Competency Objectives:						
7.60.14.01	Identify geometric characteristics and symbols (i.e., flatness, straightness, roundness, cylindricity, profile of line, profile of surface, perpendicularly, angularity, parallelism, circular, runout, total indicated runout, position, concentricity, and symmetry)	I	R			
7.60.14.02	Define maximum material condition		I	R		
7.60.14.03	Define least material condition		I	R		
7.60.14.04	Define regardless of feature size condition		I	R		
7.60.14.05	Describe feature control blocks	I	R			
7.60.14.06	Describe datum surfaces and targets		I	R		
7.60.14.07	Define flatness (pitch)	M				
7.60.14.08	Define straightness (yaw)	M				
7.60.14.09	Define roundness	M				
7.60.14.10	Define cylindrically	M				
7.60.14.11	Define profile of line	M				
7.60.14.12	Define profile of surface	M				
7.60.14.13	Define perpendicularly	M				
7.60.14.14	Define angularity	I	M			
7.60.14.15	Define parallelism	I	M			
7.60.14.16	Define circular runout		I	M		
7.60.14.17	Define total runout		I	M		
7.60.14.18	Define true position concept to determine tolerance for location of holes in mating parts		I	M		
7.60.15 Competency: Demonstrate dimensioning techniques using CAD						
Competency Objectives:						
7.60.15.01	Construct arrowheads using various styles/disciplines	M				
7.60.15.02	Apply symbols for surface and texture control		I	M		

LEVEL		11	12	AD	WS	LL
7.60.15.03	Add labels/notes to drawing	I	M			
7.60.15.04	Interpret decimal tolerance dimensions	I	R			
7.60.15.05	Dimension arcs	M	R	R		
7.60.15.06	Dimension angles	M	R	R		
7.60.15.07	Dimension curves	I	R			
7.60.15.08	Dimension rounded-end shapes	I	R			
7.60.15.09	Dimension spherical objects	I	R			
7.60.15.10	Dimension cylindrical objects	I	R			
7.60.15.11	Dimension cones, pyramids, and prisms	I	R			
7.60.15.12	Dimension features on circular center line	I	R			
7.60.15.13	Dimension theoretical print of intersection		I	R		
7.60.15.14	Dimension object using rectangular coordinate system		I	R		
7.60.15.15	Dimension object using polar coordinate system	I	R			
7.60.15.16	Dimension object using tabular coordinate system	I	R			
7.60.15.17	Dimension object using ordinate dimensioning system	M	R			
7.60.16 Competency: Apply geometric dimensioning and tolerancing using CAD						
Competency Objectives:						
7.60.16.01	Interpret decimal tolerance dimensions	I	R			
7.60.16.02	Calculate clearance fit tolerances of mating parts	I	R			
7.60.16.03	Dimension clearance fit tolerances of mating parts	I	R			
7.60.16.04	Calculate interference fit tolerances of mating parts		I	R		
7.60.16.05	Dimension interference fit tolerances of mating parts		I	R		
7.60.16.06	Calculate tolerances to mating parts using standard fit tables		I	R		
7.60.16.07	Assign tolerances to mating parts using standard fit tables		I	R		
7.60.16.08	Apply positional and form tolerancing symbols	I	R			
7.60.16.09	Apply symbols for true position	I	R			
7.60.16.10	Apply symbols for maximum material control and regardless of feature size	I	R			
7.60.16.11	Calculate effects of dimensional stack-up	I	R			
7.60.16.12	Calculate transitional fit tolerances	I	R			
7.60.16.13	Dimension transitional fit tolerances	I	R			

UNIT: 7.61 Electronics CAD Drafting						
LEVEL		**11**	**12**	**AD**	**WS**	**LL**
7.61.01 Competency: Prepare electrical/electronic CAD drawings						
Competency Objectives:						
7.61.01.01	Interpret basic electric/electronic standards and symbols	I	R			
7.61.01.02	prepare schematic drawings	I	R			
7.61.01.03	Prepare component drawings	I	R			
7.61.01.04	Prepare logic diagrams	I	R			
7.61.01.05	Prepare printed circuit board drawings	I	R			
7.61.01.06	Prepare wiring diagrams		I	R		
7.61.01.07	Prepare symbol library		I	R		
7.61.02 Competency: Prepare pneumatic/hydraulic CAD drawings						
Competency Objectives:						
7.61.02.01	Interpret basic pneumatic/hydraulic standards and symbols	I	R			
7.61.02.02	Prepare piping drawings	I	R			
7.61.02.03	Prepare isometric drawings	M	R			
7.61.02.04	Prepare graphical symbols	I	R			
7.61.02.05	Prepare pump and motor drawings	I	R			
7.61.02.06	Prepare cylinder and piston diagrams	I	R			
7.61.02.07	Prepare symbol library	I	R			
7.61.03 Competency: Demonstrate drafting with electronic symbols						
Competency Objectives:						
7.61.03.01	Identify common electrical and electronic symbols	I	M			
7.61.03.02	Demonstrate proper spelling of symbols	M	R			
7.61.03.03	Identify actual electrical and electronic components	M	R			
7.61.04 Competency: Draw electronic schematics						
Competency Objectives:						
7.61.04.01	Identify electronic symbols through circuits applications	M	R			
7.61.04.02	Demonstrate basic electronic vocabulary terms	M	R			
7.61.04.03	Identify basic circuits made up of individual electronics devices	M	R			
7.61.04.04	Trace an elctronic circuit using a schematic	M	R			
7.61.04.05	Draw a schematic diagram	M	R			

7.61.05 Competency: Draw block and logic diagrams						
Competency Objectives:						
7.61.05.01	Draw a block diagram of an electronic system	M	R			
7.61.05.02	Draw a logic diagram of an electronic system	M	R			
7.61.05.03	Draw a flow chart diagram	M	R			
7.61.06 Competency: Draw schematics from sketches						
Competency Objectives:						
7.61.06.01	Draw a schematic diagram from a bread-boarded circuit	M	R			
7.61.06.02	Draw a schematic diagram from sketches	M	R			
7.61.07 Competency: Draw schematics using a CAD program						
Competency Objectives:						
7.61.07.01	Demonstrate proper operation of CAD software	M	R			
7.61.07.02	Draw a complex schematic diagram	I	R	M		
7.61.08 Competency: Demonstrate printed circuit board construction						
Competency Objectives:						
7.61.08.01	Demonstrate processes used in circuit board construction	M	R			
7.61.08.02	Demonstrate processes used in integrated circuit manufacturing	I	R	M		
7.61.08.03	Layout and construct a circuit on a PC board	I	R	M		
7.61.08.04	Analyze PC board and integrated circuit schematics	M	R			
7.61.09 Competency: Draw industrial circuit						
Competency Objectives:						
7.61.09.01	Identify industrial schematic symbols	I	R	M		
7.61.09.02	Draw an electrical control schematic diagram	I	R	M		

UNIT: 7.62 Electronics Basics

LEVEL		11	12	AD	WS	LL
7.62.01 Competency: Demonstrate proficiency in analyzing basic electronic circuits						
Competency Objectives:						
7.62.01.01	Construct simple, series, and parallel resistive circuits		M	R		
7.62.01.02	Calculate and measure voltage, current, power and resistance of S/F DC circuits		M	R		
7.62.01.03	Calculate and measure resistor-capacitor (RC)		M	R		
7.62.01.04	Demonstrate safe use of test equipment, including DMM (Digital Multimeter) and logic probe		M	R		
7.62.01.05	Calculate total capacitance of a S-P circuit		M	R		
7.62.01.06	Identify basic schematic symbols		M	R		
7.62.01.07	Identify basic electrical/electronic components		M	R		
7.62.01.08	Construct and test a single stage C-E (common emitter) amplifier with NPN transistor		M	R		
7.62.01.09	Identify resistor values by color code		M	R		
7.62.01.10	Identify basic integrated circuits by type, number, and date		I			
7.62.01.11	Identify the various computer number systems (Binary, Hex BCD, and Octal)		I			
7.62.01.12	Perform conversions among the number systems		R			
7.62.02 Competency: Describe basic electrical terms and concepts						
Competency Objectives:						
7.62.02.01	Define voltage		M	R		
7.62.02.02	Define current		M	R		
7.62.02.03	Define resistance		M	R		
7.62.02.04	Define real power		M	R		
7.62.02.05	Define reactive power		M	R		
7.62.02.06	Define apparent power		M	R		
7.62.02.07	Define inductance		M	R		
7.62.02.08	Define inductive reactance		M	R		
7.62.02.09	Define capacitance		M	R		
7.62.02.10	Define capacitive reactance		M	R		
7.62.02.11	Define impedance		M	R		
7.62.02.12	Define mutual inductance		M	R		
7.62.02.13	Compare open vs short circuits		M	R		
7.62.02.14	Define Henry		M	R		
7.62.02.15	Define OHM		M	R		
7.62.02.16	Define Farad		M	R		

LEVEL		11	12	AD	WS	LL
7.62.02.17	Define Ampere		M	R		
7.62.02.18	Define Kirchhoff's Voltage Law		M	R		
7.62.02.19	Define Kirchhoff's Current Law		M	R		
7.62.02.20	Define effective (R.M.S.) voltage/peak		M	R		
7.62.02.21	Define byte		R			
7.62.02.22	Define bit		R			
7.62.03 Competency: Describe the major application of basic electrical devices						
Competency Objectives:						
7.62.03.01	Explain the purpose of conductors		R			
7.62.03.02	Define insulators		M	R		
7.62.03.03	Define switches		M	R		
7.62.03.04	Explain the purpose of resistors		M	R		
7.62.03.05	Explain the purpose of capacitors		M	R		
7.62.03.06	Explain the purpose of coils		M	R		
7.62.03.07	Explain the purpose of transformers		M	R		
7.62.03.08	Explain the purpose of Diode and LED and Zeners		M	R		
7.62.03.09	Explain the purpose of BJT transistor		I	M		
7.62.03.10	Explain the purpose of CMOS circuit		I	M		
7.62.03.11	Explain the purpose of gate		I	M		
7.62.03.12	Explain the purpose of not circuit		I	M		
7.62.03.13	Explain the purpose of logic probe		I	M		
7.62.03.14	Explain the purpose of flip flop		I	M		
7.62.03.15	Explain the purpose of ROM/RAM memory		I	M		
7.62.03.16	Explain the purpose of PROM memory		I	M		
UNIT: 7.63 DC Fundamentals						
7.63.01 Competency: Demonstrate proficiency in the solution of DC circuit problems						
Competency Objectives:						
7.63.01.01	Solve problems using Ohm's Law and power formula		M			
7.63.01.02	Solve problems for series circuits, voltage, current, and resistance		M			
7.63.01.03	Demonstrate the ability to analyze voltage divider circuits using Kirchohoff's Law		R			
7.63.01.04	Solve problems for parallel circuits to find unknown values of resistance, current, and voltage		M			
7.63.01.05	Demonstrate the ability to analyze current divider using Kirchhoff's Current Law		R			
7.63.01.06	Solve problems for series-parallel circuits for unknown values of resistance, current, and voltage		R			
7.63.01.07	Analyze series-parallel circuits using Kirchhoff's Law		R			

LEVEL		11	12	AD	WS	LL
7.63.02 Competency: Analyze DC circuits using common theorems						
Competency Objectives:						
7.63.02.01	Analyze DC circuits using Superposition Theorem		I	M		
7.63.02.02	Analyze DC circuits using Thevenin's Theorem		I	M		
7.63.02.03	Analyze DC circuits using Norton's Theorem		I	M		
7.63.02.04	Analyze DC circuits using Millman's Theorem		I	M		
7.63.02.05	Analyze DC circuits using Maximum Power Transfer Theorem		I	M		
7.63.03 Competency: Analyze complex electrical problems using network analysis						
Competency Objectives:						
7.63.03.01	Analyze DC circuits for resistance, current, and voltage using Branch Analysis		I	M		
7.63.03.02	Analyze DC circuits for resistance, current, and voltage using Mesh Analysis		I	M		
7.63.03.03	Analyze DC circuits for resistance, current, and voltage using Node Analysis		I	M		
UNIT: 7.64 DC Laboratory EET 112						
7.64.01 Competency: Demonstrate resistance, voltage and current measurements						
Competency Objectives:						
7.64.01.01	Identify resistor values and tolerances by color code		M	R		
7.64.01.02	Describe the operation of a valuable resistor		M	R		
7.64.01.03	Demonstrate the proper procedure for measuring voltage and current in a DC circuit		M	R		
7.64.02 Competency: Demonstrate Ohm's Law						
Competency Objectives:						
7.64.02.01	Verify Ohm's Law by measuring voltage and current with various resistors circuits		M	R		
7.64.02.02	Apply the three power formulas	I	R			
7.64.03 Competency: Demonstrate properties of series circuits						
Competency Objectives:						
7.64.03.01	Measure voltages and currents for a series circuits		M			
7.64.03.02	Analyze measured values to calculated values		R			
7.64.04 Competency: Demonstrate properties of parallel circuits						
Competency Objectives:						
7.64.04.01	Measure voltages and currents for a parallel circuits		I	M		
7.64.04.02	Analyze measured values to calculated values		I	M		

LEVEL		11	12	AD	WS	LL
7.64.05 Competency: Demonstrate properties of complex circuits						
Competency Objectives:						
7.64.05.01	Measure voltages and currents for a complex circuit		I	M		
7.64.05.02	Analyze measured values to calculated values		I	M		
7.64.06 Competency: Analyze voltage sources and loading effects						
Competency Objectives:						
7.64.06.01	Demonstrate how the connection of load to a voltage source will effect the terminal voltage		I	M		
7.64.06.02	Demonstrate how to approximate an ideal voltage source		I	M		
7.64.07 Competency: Demonstrate circuit theorems and conversions						
Competency Objectives:						
7.64.07.01	Demonstrate circuits theorems using measurements and calculations		I	M		
7.64.07.02	Analyze calculated and measured values in a more complex circuit		I	M		
7.64.08 Competency: Demonstrate network circuit analysis						
Competency Objectives:						
7.64.08.01	Utilize the K-loop program from the student disk to analyze complex DC circuits		I	M		
7.64.09 Competency: Control circuits						
Competency Objectives:						
7.64.09.01	Rate batteries		M			
7.64.09.02	Identify typical control components		M			
7.64.09.03	Read and interpret schematics and control diagrams		M			
7.64.09.04	Connect motor to control circuits		I	M		
7.64.09.05	Connect programmable controls to circuits		I	M		
7.64.09.06	Program programmable controller		R			
7.64.09.07	Troubleshoot circuits					
7.64.10 Competency: Analyze and measure characteristics of diodes and basic power supplies						
Competency Objectives:						
7.64.10.01	Examine PN junctions		I	M		
7.64.10.02	Examine diode characteristics		I	M		
7.64.10.03	Evaluate limiters and clampers		I	M		
7.64.10.04	Analyze half wave, full wave, and bridge rectifiers		I	M		
7.64.10.05	Examine non-regulated power supplies		I	M		
7.64.10.06	Examine zeneer diodes		I	M		

LEVEL		11	12	AD	WS	LL
7.64.10.07	Adapt thermistors and varistors		I	M		
7.64.10.08	Examine characteristics of light-emitting diodes (LED)		M			
7.64.11 Competency: Demonstrate troubleshooting techniques						
Competency Objectives:						
7.64.11.01	Demonstrate how various open and short conditions effect a series parallel circuit		I	M		

UNIT: 7.65 PC Hardware

EET 144

LEVEL		11	12	AD	WS	LL
7.65.01 Competency: Perform elementary PC Hardware assembly and disassembly procedures						
Competency Objectives:						
7.65.01.01	Identify specific internal components, including power supply, motherboard, disk drives, memory components, expansion slots, internal battery, and modem cards		M			
7.65.01.02	List PC disassembly procedures, including static electricity precautions		M			
7.65.01.03	Explain the reason for caution regarding static electricity when opening up a PC		M			
7.65.01.04	Remove the cover from the PC		M	R		
7.65.01.05	Replace the CMOS battery		M	R		
7.65.01.06	Connect external component parts, such as monitors and keyboard		M	R		
7.65.02 Competency: Install a modem						
Competency Objectives:						
7.65.02.01	Describe the function of a modem		M	R		
7.65.02.02	Describe features of telecommunications via modem, including CCITT recommended standards, ISDN, facsimile boards and machines, and scanners		M	R		
7.65.02.03	Explain the operation of telephone connections and modems		M	R		
7.65.02.04	Install a modem in a PC		M	R		
7.65.02.05	Install the required modem software		M	R		
7.65.02.06	Troubleshoot the modem and software for correct function		M	R		
7.65.03 Competency: Use a modem						
Competency Objectives:						
7.65.03.01	Describe the functions of various telecommunications resources available through a modem/network connection, including bulletin boards, on-line services, e-mail, banking by modem, telecommuting, and internet		M	R		
7.65.03.02	Demonstrate use of a modem to access on-line reference sources such as libraries, bulletin board systems, and internet		M	R		
7.65.03.03	Download information from an on-line service		M	R		
7.65.03.04	Send a fax	M	R			

LEVEL		11	·12	AD	WS	LL
7.65.04 Competency: Perform diagnosis of PC hardware and software						
Competency Objectives:						
7.65.04.01	Use a standard text editor to make hardware guiding changes to the Auto Exec. Bat and config. Sys files		M	R		
7.65.04.02	Format disks	M	R			
7.65.04.03	Move directories and files	M	R			
7.65.04.04	Rename directories and files	M	R			
7.65.04.05	Delete directories and files	M	R			
7.65.04.06	Check disks for viruses	M	R			
7.65.04.07	Apply proper software and techniques to remove viruses and immunize files	M	R			
7.65.04.08	Explain the importance of scheduling automatic virus detection and cleaning	M	R			
7.65.04.09	Defragment files on a hard disk so as to optimize (speed up) access to these files		M	R		
7.65.05 Competency: Use disk recovery utilities						
Competency Objectives:						
7.65.05.01	Define the following terminology related to disk problems: booting from a floppy, unerase software, jumbled FAT, head crash, mean time before failure, crash recovery, disk backup, lost clusters, CMOS information restoration, Partition table information repair, surface scan, disk revitalization, emergency disk		M	R		
7.65.05.02	Use a recovery disk to boot a PC that has lost its self-boot ability		M	R		
7.65.05.03	Diagnose and fix common disk problems (with one of the popular disk, repair utilities)		M	R		
7.65.05.04	Restore CMOS values using the PC's BIOS setup routine		M	R		
7.65.05.05	Create a backup of important disk data		M	R		
7.65.05.06	Create an emergency boot disk		M	R		
7.65.06 Competency: Diagnose and manage memory problems						
Competency Objectives:						
7.65.06.01	Define the types of memory found in the PC	M	R			
	Use memory testing utilities to inspect existing memory as to quantity, speed, etc.		M	R		
7.65.06.02	Specify types of memory upgrades, current cost, and sources for memory in a particular PC		M	R		
7.65.06.03	Install memory upgrade modules		M	R		
7.65.06.04	Test memory upgrade modules		M	R		

LEVEL		11	12	AD	WS	LL
7.65.06.05	Explain the functions of ROM BIOS		M	R		
7.65.06.06	Explain ROM BIOS compatibility and BIOS differences		M	R		
7.65.06.07	Use the ROM BIOS		M	R		
7.65.06.08	Replace the ROM BIOS chips		M	R		
7.65.07 Competency: Perform hardware support operations on disk drives						
Competency Objectives:						
7.65.07.01	Describe the differing purposes of floppy drives, hard drives, and CD ROM drives	M	R			
7.65.07.02	Install a floppy drive		M	R		
7.65.07.03	Format and set up boot traps on a floppy		M	R		
7.65.07.04	Discuss aspects of hard drives, including capacity, speed, partitioning, formatting, installation, and multiple drives		M	R		
7.65.07.05	Install one or two hard drives in a computer system		M	R		
7.65.07.06	Partition and format hard drives		M	R		
7.65.07.07	Discuss aspects of CD ROM drives, including capacity, installation, and setup		M	R		
7.65.07.08	Install a CD ROM drive		M	R		
7.65.07.09	Use a CD ROM drive		M	R		
7.65.08 Competency: Perform PC hardware support operations on motherboards and PC systems						
Competency Objectives:						
7.65.08.01	Identify motherboard expansion slots		M	R		
7.65.08.02	Set the interrupt level on expansion cards		M	R		
7.65.08.03	Set the DMA on expansion cards		M	R		
7.65.08.04	Set the IO port address on expansion cards		M	R		
7.65.08.05	Explain the difference between monochrome EGA and VGA monitors		M	R		
7.65.08.06	Chose a cable for each type of monitor		M	R		
7.65.08.07	Connect a keyboard		M	R		
7.65.08.08	Identify a parallel printer cable, a serial data cable, and a joystick cable		M	R		
7.65.09 Competency: Evaluate system versus component purchase options						
Competency Objectives:						
7.65.09.01	Specify a complete prepackaged PC system (striving for parity with the prepackaged PC system) that uses parts assembled from many vendors, by using vendor catalogs, outside vendors, magazine advertisements, or any other sources of information		M	R		

LEVEL		11	12	AD	WS	LL
7.65.09.01	Compare the prices and capabilities of the prepackaged versus the assembled PC systems		M	R		
7.65.09.01	Recommend and justify the purchase of one of the two systems, based on the comparison of prices and capabilities		M	R		
7.65.10 Competency: Perform a customized upgrade on a PC						
Competency Objectives:						
7.65.10.01	Apply knowledge and skills gained in the previous PC hardware competencies to specify parts from vendors for customization of a PC		I	M	R	
7.65.10.02	Apply knowledge and skills gained in the previous PC hardware competencies to add devices and customized a PC		I	M	R	

Evaluation of Program Effectiveness

The effectiveness of the Engineering Technologies program at each high school will be evaluated as follows:

1. Students enrolled in the program will be given pre- and post-tests to determine program effectiveness.
2. The tech prep teachers at each school will analyze the results of the college placement tests given to students entering post-secondary training. Curricular changes/additions will be implemented as needed.
3. Employability skills will be evaluated on an on-going basis by each student's mentorship supervisor. The evaluations will be discussed with the student and suggestions for improvement made, as needed.
4. The Heart of Ohio Tech Prep Consortium annual survey will be compiled each year and is an indication of the effectiveness of the Engineering Technologies program; program completers are contacted to determine who is pursing education and/or employment in fields related to engineering.
5. A one- and three-year follow-up survey will be sent to program completers to discern how satisfied each party is with the effectiveness of the Engineering Technologies program; comments and suggestions for improvement in program effectiveness are also required.

Pupil Evaluation Policy

A portion of the student's grade will be based on attendance, attitude and cooperation. Students' levels of achievement shall be measured by logical combinations of the following methods:

1. Quizzes
2. Homework
3. Written tests
4. Teacher observations
6. Individual and team projects
7. Class participation
8. Oral and written reports
9. Team work and class-related performance
10. Semester examinations
11. Student-led conferences

HEART of OHIO TECH PREP CONSORTIUM

1997

Engineering Technologies Core Model

PART IV:
Postsecondary Competencies

A. Columbus State Community College

B. Ohio University - Lancaster

COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ♦ ARCHITECTURE TECHNOLOGY

STUDENT OUTCOMES	ENGL 101	MATH 104	ARCH 111	CMGT 120	ARCH 100	ENGL 102	CPT 101	MATH 148	CMGT 121	ARCH 161	COMM 105
1. Create manual and computer graphic representations of orthographic and isometric projections.			F							F	
2. Use geometry to solve problems with areas and intersecting surfaces and lines.			F							F	
3. Work with one- and two-point perspectives, shades and shadows, and free-hand drawing techniques to express relevant ideas graphically.										F	
4. Generate and organize schedules and details within a complete set of architectural working drawings.				F					F	F	
5. Research materials, consult with industry experts, and use CSI standards to create a set of specifications to support the architectural drawings.				F					F		
6. Read and interpret information from architectural drawings for the estimating and bidding process.									F		
7. Use building construction standards and codes to ensure that architectural drawings comply with legal and safety guidelines.				F					F		
8. Assist the architect in solving and drawing structural details by referring to information on statics/strength of materials, basic knowledge of wood structures, and steel and concrete hand books/reference materials.											
9. Create isometric layouts of basic mechanical systems employed in commercial buildings.					F/S					F	
10. Recognize and understand architectural style and historical heritage.											
11. Develop site plan layouts.			F						F	F	
12. Think critically.	F	F/S				F		F/S	F	F	
13. Solve problems.		F/S	F	F	F	F	F	F/S		F	
14. Communicate effectively.	F	F	F		F		F	F		F	F
15. Demonstrate interpersonal skills.					F						
16. Recognize the value of human diversity.					F						
17. Demonstrate life management skills.		F						F			

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COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ♦ ARCHITECTURE TECHNOLOGY

STUDENT OUTCOMES	ARCH 113	BMGT 111	LAND 152	ARCH 155	CIVL 232	ARCH 250	ARCH 212	ARCH 232	ARCH 262	ARCH 112
1. Create manual and computer graphic representations of orthographic and isometric projections.	F/S			F		F	F		S	F
2. Use geometry to solve problems with areas and intersecting surfaces and lines.	F/S		F/S	F						
3. Work with one- and two-point perspectives, shades and shadows, and free-hand drawing techniques to express relevant ideas graphically.									F/S	
4. Generate and organize schedules and details within a complete set of architectural working drawings.				F		F				
5. Research materials, consult with industry experts, and use CSI standards to create a set of specifications to support the architectural drawings.				F		F/S		F		
6. Read and interpret information from architectural drawings for the estimating and bidding process.			F	F		F	F			F
7. Use building construction standards and codes to ensure that architectural drawings comply with legal and safety guidelines.				F		F	F	S		
8. Assist the architect in solving and drawing structural details by referring to information on statics/strength of materials, basic knowledge of wood structures, and steel and concrete hand books/reference materials.				F/S	F	F				
9. Create isometric layouts of basic mechanical systems employed in commercial buildings.							F/S			
10. Recognize and understand architectural style and historical heritage.				F						
11. Develop site plan layouts.	F		F/S							
12. Think critically.			F				F		F	F
13. Solve problems.	F	F	F	F	F	F	F		F	F
14. Communicate effectively.									F	
15. Demonstrate interpersonal skills.			F							
16. Recognize the value of human diversity.										
17. Demonstrate life management skills.										

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COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ♦ ARCHITECTURE TECHNOLOGY

STUDENT OUTCOMES	CIVL 237	ENGL 204	HUM 1XX	ARCH 214	ARCH 263	SSCI 10X	ARCH 216		ARCH 264	XXX XXX
1. Create manual and computer graphic representations of orthographic and isometric projections.				F	F/S		F		S	
2. Use geometry to solve problems with areas and intersecting surfaces and lines.	F				F/S				S	
3. Work with one- and two-point perspectives, shades and shadows, and free-hand drawing techniques to express relevant ideas graphically.									S	
4. Generate and organize schedules and details within a complete set of architectural working drawings.	F				F/S				F/S	
5. Research materials, consult with industry experts, and use CSI standards to create a set of specifications to support the architectural drawings.	F				F			F	F/S	
6. Read and interpret information from architectural drawings for the estimating and bidding process.	F				F/S				F/S	
7. Use building construction standards and codes to ensure that architectural drawings comply with legal and safety guidelines.	F			F	F/S		F	F	F/S	
8. Assist the architect in solving and drawing structural details by referring to information on statics/strength of materials, basic knowledge of wood structures, and steel and concrete hand books/reference materials.	F/S				S			F	S	
9. Create isometric layouts of basic mechanical systems employed in commercial buildings.				F/S			F/S		S	
10. Recognize and understand architectural style and historical heritage.			F							
11. Develop site plan layouts					F/S				S	
12. Think critically.	F	F		F	F/S	F	F	F	F/S	
13. Solve problems.	F			F	F/S	F	F	F	F/S	
14. Communicate effectively.		F	F		F	F			F/S	
15. Demonstrate interpersonal skills.			F/S			F/S			F	
16. Recognize the value of human diversity.			F/S			F/S				
17. Demonstrate life management skills.										

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COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ♦ ARCHITECTURE TECHNOLOGY

STUDENT OUTCOMES	ARCH 113	BMGT 111	LAND 152	ARCH 155	CIVL 232	ARCH 250	ARCH 212	ARCH 232	ARCH 262	ARCH 112
1. Create manual and computer graphic representations of orthographic and isometric projections.	F/S			F		F	F		S	F
2. Use geometry to solve problems with areas and intersecting surfaces and lines.	F/S		F/S	F						
3. Work with one- and two-point perspectives, shades and shadows, and free-hand drawing techniques to express relevant ideas graphically.									F/S	
4. Generate and organize schedules and details within a complete set of architectural working drawings.				F		F				
5. Research materials, consult with industry experts, and use CSI standards to create a set of specifications to support the architectural drawings.				F		F/S		F		
6. Read and interpret information from architectural drawings for the estimating and bidding process.			F	F		F	F			F
7. Use building construction standards and codes to ensure that architectural drawings comply with legal and safety guidelines.				F		F	F	S		
8. Assist the architect in solving and drawing structural details by referring to information on statics/strength of materials, basic knowledge of wood structures, and steel and concrete hand books/reference materials.				F/S	F	F				
9. Create isometric layouts of basic mechanical systems employed in commercial buildings.							F/S			
10. Recognize and understand architectural style and historical heritage.				F						
11. Develop site plan layouts.	F		F/S							
12. Think critically.			F				F		F	F
13. Solve problems.	F	F	F	F	F	F	F		F	F
14. Communicate effectively.									F	
15. Demonstrate interpersonal skills.			F							
16. Recognize the value of human diversity.										
17. Demonstrate life management skills.										

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Architecture Technology
Methods of Formative and Summative Assessment
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Student Outcome	Methods of Formative Assessment	Methods of Summative Assessment
1. Create manual and computer graphic representations of orthographic and isometric projections.	Lab performance and homework exercises manually drafting orthographic and isometric views with correct symbols and notations. Lab performance using computer graphics to draft orthographic and isometric views with correct symbols and notations. Lab performance and homework exercises calculating stairs, structural framing components, and mechanical and electrical systems components sizes, layouts, and spatial allocations. Written and drafted quizzes and midterms. (Architecture 111, 161, 155, 250, 212, 112, 113, 214, 216)	Lab performance producing construction details and complete sets of preliminary and production working drawings using both manual and computer aided drafting. Lab performance writing and editing a project manual including product, reference and performance specifications. Lab performance of BOCA code compliance evaluations for projects. Written and oral tests. (Architecture 263 and 264)
2. Use geometry to solve problems with areas and intersecting surfaces and lines.	Lab performance and homework exercises using elements of geometric analysis and descriptive geometric analysis to find intersections of planes, interference points, surface areas and developments. Lab exercises and calculations related to stress and force resolutions. Lab exercises and calculations related to surveying of land areas. Written, oral and drafted tests. (Architecture 111, 161, 155, and 263/Civil 237/LAND152)	Lab exercise and calculation performance to check building compliance with BOCA requirements. Lab creation of working drawing elements incorporating building geometrics and grids. (Architecture 263 and 264) Layout and measurement of property boundaries in laboratory. LAND152 Written tests and equipment use tests.

Architecture Technology
Methods of Formative and Summative Assessment
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Student Outcome	Methods of Formative Assessment	Methods of Summative Assessment
3. Work with one-and two-point perspectives, shades and shadows, and computer drawing techniques to express relevant ideas graphically.	Laboratory projects laying out and composing sheet of working drawings rendering perspectives and creating free-hand representations of architectural structures. Written and drafted tests. (Arch 161 and 262)	Creating architectural client type presentations including sketches, drawings and models. (Arch 262 and 264)
4. Generate and organize schedules and details within a complete set of architectural working drawings.	Selecting and researching products and creating details incorporating the products evaluating existing architectural drawings for BOCA code compliance. Written and drafted tests. (ARCH 250, 263 and 264)	Creating and selecting schedules and details required to complete architectural working drawing sets for construction projects. Drafted tests. (ARCH 263 and 264)
5. Research materials consult with industry experts, and use CSI standards to create a set of specifications to support the architectural drawings.	Laboratory evaluation of material properties through both destructive and non-destructive ASTM testing procedures. Laboratory exercises reading and completing written exercises related to construction project specifications, calculations to design structural materials to meet requirements of BOCA code. Written tests. (CIVL 120, 155, 250, 232, 263, and 264/CIVL237/CMGT121)	Select materials from manufacturer's literature, check BOCA compliance, and incorporate into architectural working drawings and specifications. Interview manufacturer's representatives about products, collect samples and evaluate for design requirements. (ARCH 264)
6. Read and interpret information from architectural drawings for the estimating and bidding process.	Perform written exercises to read and interpret working drawings. Calculate material quantities from architectural drawings. Written tests. (CMGT121)	

Architecture Technology
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Student Outcome	Methods of Formative Assessment	Methods of Summative Assessment
7. Use building construction standards and codes to ensure that architectural drawings comply with legal and safety guidelines	Interpret BOCA code application and write specific project requirements, perform BOCA specified tests in laboratory exercises. Various lab exercises and worksheets with mock situations and requirements. Written and drafted tests. (CIVL 120, 155, 250, 212, 214, 216, 263 and 264/ CIVL237/CMGT121	Lab exercises using BOCA, association standards and testing reports to select/reject building construction products for a simulated project. (ARCH 232, 263, 264)
8. Assist the architect in solving and drawing structural details by referring to information on statics/strength of materials, basic knowledge of wood structures, and steel and concrete hand books/reference materials.	Perform simulated structural calculations. Draft structural connections and fabrication drawings. Written tests. (ARCH 155 and 250/CIVL 232, 237)	Lab exercises selecting, modifying, and adapting structural materials and products to the conditions in simulated buildings. (ARCH 155, 263, and 264)
9. Create isometric layouts of basic mechanical systems employed in commercial buildings.	Lab exercise relating site utility, electrical, HVAC, and plumbing to the architectural working drawing and specifications. Written and drafted tests. (ARCH 161, 212, 214, 216)	Final project assignments documenting site utility, electrical, HVAC and plumbing to construction documents. (ARCH 212, 214, 216 and 264)
10. Recognize and understand architectural style and historical heritage.	Performance on quizzes, projects, and written comparisons (ARCH 100)	None
11. Develop site plan layouts for new buildings.	Read and interpret field data to evaluate conditions in simulated lab situations. Written and drafted tests and exercises. (ARCH 111, 161 and LAND 152, CMGT 121)	Lab exercises using surveying equipment to simulate industry field conditions. Written and equipment usage testing. (LAND 152)

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Student Outcome	Methods of Formative Assessment	Methods of Summative Assessment
12. Think critically.	Problem solving techniques. Written examinations. Laboratory projects. Design exercises. Quality control labs. BMGT 111	Capstone project. ARCH264: Simulated and actual problem situations to analyze and solve.
13. Solve problems.	Written examination. Laboratory exercises. Project simulations. Intern performance. Design exercises.	Capstone course. Simulated and actual problems to analyze and solve.
14. Communicate effectively.	Group critiques. Group and individual oral presentations. Discussion groups.	Capstone course. Project coordination with team, clients, and other classes.
15. Demonstrate interpersonal skills.	Group critiques. Group research and presentation projects.	Capstone project. Team project assignment requiring close interpersonal coordination.
16. Recognize the value of human diversity.	Group discussions Team research and presentation projects.	Capstone project. Team members dependent on each other for success.
17. Demonstrate life management skills.	Performance responsibilities. Deadlines. Counseling sessions.	Capstone project. Project assignment requiring systematic orderly approach at management.

COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ♦ CIVIL ENGINEERING TECHNOLOGY

STUDENT OUTCOMES	ENGL 101	MATH 135	ARCH 111	CMGT 121	CIVL 120	ENGL 102	MATH 148	CMGT 105	CIVL 121	CMGT 131	ARCH 112
1. Manually or with the assistance of computer aided drafting (CAD) prepare engineering drawings for public and private works projects.			F	F							F
2. Apply appropriate proportioning, mixing, placing, curing and admixtures to ensure quality structural concrete structures.		F			F				F		
3. Using ACI standards to correctly proportion concrete mixtures, design and detail simple structural concrete columns, beams, slabs and footings.		F		F					F		
4. Correctly apply regulatory and industry standards to design storm water management systems.	F										
5. Correctly apply regulatory and industry standards to design sanitary wastewater conveyance and treatment facilities.	F										
6. Perform all field operations to determine preliminary route alignment, prepare centerline and offset staking notes and stake a proposed project for finish grade complete with cut sheet.							F				
7. Correctly apply Ohio Department of Transportation (ODOT), Federal Highway Administration (FHWA) and industry design standards to plan, design and detail a simulated highway including drainage structures.							F				
8. Apply subdivision regulations and surveying laws in the preparation of preliminary sketch, preliminary plat and final plat for a major private land subdivision.							F				F
9. Perform preliminary site investigations, research infrastructure records, secure appropriate codes and regulations and prepare a set of preliminary drawings of an urban redevelopment site.					F	F	F		F		
10. Employ modern supervision techniques in field crew and work team settings.											
11. Perform quantity takeoffs for bid checking.				F						F	
12. Think critically.	F	F/S		F	F		F				F
13. Solve problems.		F/S	F						F	F	F
14. Communicate effectively.	F	F					F				
15. Demonstrate interpersonal skills.											
16. Recognize the value of human diversity.											
17. Demonstrate life management skills.		F					F				

COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ♦ CIVIL ENGINEERING TECHNOLOGY

STUDENT OUTCOMES	GEOL 101 or PHYS 117	CPT 101	CMGT 106	SURV 141	CMGT 123	ENGL 204	COMM 105	CIVL 232	CMGT 125	SURV 241	CIVL 221
1. Manually or with the assistance of computer aided drafting (CAD) prepare engineering drawings for public and private works projects.		F									
2. Apply appropriate proportioning, mixing, placing, curing and admixtures to ensure quality structural concrete structures.	F										
3. Using ACI standards to correctly proportion concrete mixture, design and detail simple structural concrete columns, beams, slabs and footings.	F							F			
4. Correctly apply regulatory and industry standards to design storm water management systems.		F									F
5. Correctly apply regulatory and industry standards to design sanitary wastewater conveyance and treatment facilities.		F									F
6. Perform all field operations to determine preliminary route alignment, prepare centerline and offset staking notes and stake a proposed project for finish grade complete with cut sheet.										S	
7. Correctly apply Ohio Department of Transportation (ODOT), Federal Highway Administration (FHWA) and industry design standards to plan, design and detail a simulated highway including drainage structures.				F	F				F	F	
8. Apply subdivision regulations and surveying laws in the preparation of preliminary plat and final plat for a major private land subdivision.											
9. Perform preliminary site investigations research infrastructure records, secure appropriate codes and regulations and prepare a set of preliminary drawings of an urban redevelopment site.		F				F	F				
10. Employ modern supervision techniques in field crew and work team settings.			F	F					F		
11. Perform quantity takeoffs for bid checking.					F						
12. Use building construction standards, and codes to ensure the drawings comply with legal, safety and construction standards.											
13. Think critically.				F	F	F					
14. Solve problems.	F	F		F/S				F		F/S	F
15. Communicate effectively.		F				F	F				
16. Demonstrate interpersonal skills.				F							
17. Recognize the value of human diversity.											
18. Demonstrate life management skills.											

COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ♦ CIVIL ENGINEERING TECHNOLOGY

STUDENT OUTCOMES	SSCI 10X	MCT 106	SURV 243	CIVL 223	SURV 245	HUM 1XX	SURV 247	SURV 249	XXX XXX
1. Manually or with the assistance of computer aided drafting (CAD) prepare engineering drawings for public and private works projects.		F						S	
2. Apply appropriate proportioning, mixing, placing, curing and admixtures to ensure quality structural concrete structures.									
3.a. Using ACI standards to correctly proportion concrete mixtures, design and detail simple structural concrete columns, beams, slabs and footings. 3.b. Use AISC standards		F/S							
4. Correctly apply regulatory and industry standards to design storm water management systems.		F		S					
5. Correctly apply regulatory and industry standards to design sanitary wastewater conveyance and treatment facilities.		F		S					
6. Perform all field operations to determine preliminary route alignment, prepare centerline and offset staking notes and stake a proposed project for finish grade complete with cut sheet.									
7. Correctly apply Ohio Department of Transportation (ODOT), Federal Highway Administration (FHWA) and industry design standards to plan, design and detail a simulated highway including drainage structures.			S		S				
8. Apply subdivision regulations and surveying laws in the preparation of preliminary sketch, preliminary plat and final plat for a major private land subdivision.					F		S	S	
9. Perform preliminary site investigations research infrastructure records, secure appropriate codes and regulations and prepare a set of preliminary drawings of an urban redevelopment site.		F	F		F		F	S	
10. Employ modern supervision techniques in field crew and work team settings.	F					F		S	
11. Perform quantity takeoffs for bid checking.									
12. Think critically.	F								
13. Solve problems.	F	F					F	F	
14. Communicate effectively.	F	F				F			
15. Demonstrate interpersonal skills.	F/S					F/S	F		
16. Recognize the value of human diversity.	F/S					F/S			
17. Demonstrate life management skills.									

Civil Engineering Technology
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Student Outcome	Methods of Formative Assessment	Methods of Summative Assessment
1. Manually or with the assistance of computer aided drafting (CAD) prepare engineering drawings for public and private works projects.	Lab performance and homework exercises preparing orthographic and isometric views complete with symbology. Lab performance on technology specific exercises including preparation of site plans, floor plans, mechanical and electrical schematics. Written and drafted quizzes and examinations.	Laboratory performance in a project team setting preparing working drawings, concept drawings, master plans, preliminary and final plats.
2. Apply appropriate proportioning, mixing, placing, curing and admixtures to ensure quality structural concrete structures.	Laboratory evaluation of material properties of concrete through both destructive and non-destructive ASTM testing procedures. Written quizzes and examinations.	Selection of appropriate concrete mixture to satisfy specific design parameters in a laboratory setting.
3. Using ACI standards to correctly proportion concrete mixtures, design and detail simple structural concrete columns, beams, slabs and footings.	Lab performance and homework exercises performing design calculations. Written quizzes and examinations.	Laboratory performance on a design basis.
4. Correctly apply regulatory and industry standards to design storm water management systems.	Written laboratory and homework exercises applying City of Columbus Standards in sizing storm water collection and retention facilities. Written quizzes and examinations.	Laboratory performance in a project team setting designing and detailing a storm water management system for a small residential subdivision.
5. Correctly apply regulatory and industry standards to design sanitary wastewater conveyance and treatment facilities.	Written laboratory and homework exercises applying Ohio EPA and Ten State Standards in sizing wastewater collection facilities. Written quizzes and examinations.	Laboratory performance in a project team setting selecting and sizing the appropriate unit processes to satisfy receiving stream water quality standards for a community of 12,000 population equivalent.

Civil Engineering Technology
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Student Outcome	Methods of Formative Assessment	Methods of Summative Assessment
6. Perform all field operations to determine preliminary route alignment, prepare centerline and offset staking notes and stake a proposed project for finish grade complete with cut sheet.	Written and field laboratory exercises emphasizing the use of modern surveying equipment techniques and procedures in an myriad of applications. Written examinations and field practical.	Laboratory performance in a project team setting collecting data, determining alignment, preliminary and final staking of a connecting road.
7. Correctly apply Ohio Department of Transportation (ODOT), Federal Highway Administration (FHWA) and industry design standards to plan, design and detail a simulated highway including drainage structures.	Written and laboratory exercises emphasizing the use of ODOT standards in determining horizontal and vertical alignment of highways. Written quizzes and examinations.	Laboratory performance in a project team setting in developing working drawings for a short highway project.
8. Apply subdivision regulations and surveying laws in the preparation of preliminary sketch, preliminary plat and final plat for a major private land subdivision.	Written laboratory and homework exercises applying federal government and Franklin County Standards in the subdivision of public and private lands. Written quizzes and examinations.	Laboratory performance in a project team setting in resolving conflicting deed and description information, performing research of public records, applying local regulations to prepare a preliminary and final subdivision plat.
9. Perform preliminary site investigations, research infrastructure records, secure appropriate codes and regulations and prepare a set of preliminary drawings of an urban development/redevelopment site.	Written laboratory, research and homework exercises applying accepted industry and local planning techniques to a myriad of situations. Written quizzes.	Laboratory performance in a project team setting applying planning and design concepts to a specific community/college project. Formal presentation to a community/college panel is included in the process.
10. Employ modern supervision techniques in field crew and work team settings.	Written classroom and homework exercises. Written quizzes and examinations.	Observations of individuals during the performance of projects in team settings. Emphasis on team building, setting and fulfilling deadlines.

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Student Outcome	Methods of Formative Assessment	Methods of Summative Assessment
14. Think critically.	Planning, selecting correct equipment, applying industry standard procedures, and executing laboratory assignments. Assessment tools include performance on laboratory exercises.	Laboratory performance in a project team setting selecting appropriate codes and standards, assign tasks, select team members, establish deadlines and prepare working drawings for a community/college projects.
15. Solve problems.	Written laboratory, research and homework exercises including conceptual, situational, numerical and graphic solutions. Assessment tools include written quizzes, oral, graphic and written exercises and written tests.	Laboratory performance in a team setting applying industry codes and standards to solve a community/college problem.
16. Communicate effectively.	Written, graphic, oral and media (slide/tape) presentations outlining testing, installation and application methods and procedures intrinsic to the construction industry. Use of technical terms and concepts used in the construction industry. Assessment tools include laboratory projects, original and/or media research, quizzes and tests.	Individual and team laboratory performance in making presentations outlining a construction technique, procedure, testing method and/or solution to a community/college problem.
17. Demonstrate interpersonal skills.	Perform original research, laboratory assignments and presentations in a cooperative project team setting. Assessment tools include actual performance of assignments within the specified deadline times.	Project team laboratory performance in setting goals, establishing priorities, developing schedules and assigning tasks in simulated work (industry) environment. Team building, leadership and cooperative effort are assessed through team performance on production projects.

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Student Outcome	Methods of Formative Assessment	Methods of Summative Assessment
18. Recognize the value of human diversity.	Research, written exercises, quizzes and written examinations concerning contributions by and trends of "non-traditional" groups in the construction industry.	Laboratory performance in a team setting recognizing the strengths of each team member and the contribution of each team member toward a common goal.
19. Demonstrate life management skills.	Research, written exercises, quizzes, reference notebooks, and written examinations concerning career decisions, responsibilities and opportunities within the construction industry.	Laboratory performance in a team setting to set goals, establish deadlines and allocate and manage time on a common project.

COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ♦ CONSTRUCTION MANAGEMENT TECHNOLOGY

STUDENT OUTCOMES	ENGL 101	CMGT 101	CMGT 121	CMGT 105	CMGT 115	CMGT 123	ENGL 102	MATH 104	CMGT 131	CMGT 106	CPT 101
1. Analyze and interpret all types of construction drawings and documents.	F	F	F	F	F	F	F	F	F	F	
2. Calculate quantities of material, labor, and equipment needed for a project.	F		F			F		F	F		
3. Analyze financial data relative to construction work in the field and office.		F						F			
4. Control field operations through cost analysis and productivity analysis.											
5. Apply data analysis to identify construction problems, specify goals, and execute projects.		F								F	
6. Utilize the critical path and Gantt bar chart methods to organize complex construction projects.		F		F						F	
7. Identify and understand the major elements in construction labor and contract law.		F		F						F	
8. Operate and use microcomputers, pre- ckaged project management software, 5 mm camera, scan machine and time-lapse projector.			F			F			F		
9. Stake out control points for projects using modern laser surveying equipment.											
10. Assist in developing marketing tools and objectives to increase the sales of no-bid jobs for their employers.		F									
11. Assist in purchasing or safety/loss control of equipment and materials.		F		F	F	F			F	F	
12. Apply bid strategies to marketing proposals for building and heavy construction type projects.		F				F			F		
13. Assist in resolving construction disputes, claims and arbitration/litigations.	F	F		F	F		F			F	
14. Think critically.	F		F			F	F	F/S			
15. Solve problems.		F		F	F			F/S	F	F	F
16. Communicate effectively.	F						F	F			
17. Demonstrate interpersonal skills.		F								F	
18. Recognize the value of human diversity.											
19. Demonstrate life management skills.								F			

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COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ◆ CONSTRUCTION MANAGEMENT TECHNOLOGY

STUDENT OUTCOMES	CMGT 125	MTH 148	CMGT 135	CMGT 141	CIVL 120	MCT 106	MATH 135	CMGT 248	CMGT 241	CMGT 243	SURV 141
1. Analyze and interpret all types of construction drawings and documents.				S				S			
2. Calculate quantities of material, labor, and equipment needed for a project.	F	F		S	F		F	S	S		
3. Analyze financial data relative to construction work in the field and office.	F	F	F	S	F		F	S	S	S	
4. Control field operations through cost analysis and productivity analysis.	F	F	F	S	F		F	S	S		
5. Apply data analysis to identify construction problems, specify goals, and execute projects.			F	S				S	S	S	
6. Utilize the critical path and Gantt bar chart methods to organize complex construction projects.									S		
7. Identify and understand the major elements in construction labor and contract law.			F							S	
8. Operate and use microcomputers, prepackaged project management software, time-lapse video camera, 35 mm camera, scan machine and time-lapse projector.	F			S		F		S	S		
9. Stake out control points for projects using modern laser surveying equipment.		F					F				S
10. Assist in developing marketing tools and objectives to increase the sales of no-bid jobs for their employers.											
11. Assist in purchasing or safety/loss control of equipment and materials.			S						S		
12. Apply bid strategies to marketing proposals for building and heavy construction type projects.		F		S		F	F	S	S		
13. Assist in resolving construction disputes, claims and arbitration/litigations.										S	
14. Think critically.		F/S	F				F/S			F	
15. Solve problems.	F	F/S	F	F	F		F/S	F	F		F
16. Communicate effectively.		F				F	F		F		
17. Demonstrate interpersonal skills.										F	
18. Recognize the value of human diversity.											
19. Demonstrate life management skills.		F					F				

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COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ◆ CONSTRUCTION MANAGEMENT TECHNOLOGY

STUDENT OUTCOMES	HUM 1XX	CMGT 251	CMGT 252	CMGT 253	CMGT 231	COMM 105	SSCI 10X	ENGL 200	CMGT 261	CMGT 263	SURV 241
1. Analyze and interpret all types of construction drawings and documents.		S	S			F		F	S	S	S
2. Calculate quantities of material, labor, and equipment needed for a project.		S			F				S		
3. Analyze financial data relative to construction work in the field and office.		S			F				S	S	
4. Control field operations through cost analysis and productivity analysis.		S			F				S		
5. Apply data analysis to identify construction problems, specify goals, and execute projects.		S		F					S	S	
6. Utilize the critical path and Gantt bar chart methods to organize complex construction projects.		S							S	S	
7. Identify and understand the major elements in construction labor and contract law.			S						S	S	
8. Operate and use microcomputers, pre-packaged project management software, 35 mm camera, scan machine and time-lapse projector.		S			S				S	S	S
9. Stake out control points for projects using modern laser surveying equipment.											S
10. Assist in developing marketing tools and objectives to increase the sales of no-bid jobs for their employers.				F					S	S	
11. Assist in purchasing or safety/loss control of equipment and materials.		S		F	F				S		
12. Apply bid strategies to marketing proposals for building and heavy construction type projects.		S		F	S				S	S	
13. Assist in resolving construction disputes, claims and arbitration/litigations.											
14. Think critically.		F		F	S		F	F	F		
15. Solve problems.		F		F	F		F		F	F	F
16. Communicate effectively.	F	F		F		F	F	F	F		
17. Demonstrate interpersonal skills.	F/S	F		F			F/S		F		
18. Recognize the value of human diversity.	F/S						F/S				
19. Demonstrate life management skills.				F							

COLUMBUS STATE COMMUNITY COLLEGE

ASSESSMENT MATRIX ◆ CIVIL ENGINEERING TECHNOLOGY

STUDENT OUTCOMES	ENGL 101	MATH 135	ARCH 111	CMGT 121	CIVL 120	ENGL 102	MATH 148	CMGT 105	CIVL 121	CMGT 131	ARCH 112
1. Manually or with the assistance of computer aided drafting (CAD) prepare engineering drawings for public and private works projects.			F	F							F
2. Apply appropriate proportioning, mixing, placing, curing and admixtures to ensure quality structural concrete structures.		F			F				F		
3. Using ACI standards to correctly proportion concrete mixtures, design and detail simple structural concrete columns, beams, slabs and footings.		F		F					F		
4. Correctly apply regulatory and industry standards to design storm water management systems.	F										
5. Correctly apply regulatory and industry standards to design sanitary wastewater conveyance and treatment facilities.	F										
6. Perform all field operations to determine preliminary route alignment, prepare centerline and offset staking notes and stake a proposed project for finish grade complete with cut sheet.							F				
7. Correctly apply Ohio Department of Transportation (ODOT), Federal Highway Administration (FHWA) and industry design standards to plan, design and detail a simulated highway including drainage structures.							F				
8. Apply subdivision regulations and surveying laws in the preparation of preliminary sketch, preliminary plat and final plat for a major private land subdivision.							F				F
9. Perform preliminary site investigations, research infrastructure records, secure appropriate codes and regulations and prepare a set of preliminary drawings of an urban redevelopment site.					F	F	F		F		
10. Employ modern supervision techniques in field crew and work team settings.											
11. Perform quantity takeoffs for bid checking.				F						F	
12. Think critically.	F	F/S		F	F		F				F
13. Solve problems.		F/S	F						F	F	F
14. Communicate effectively.	F	F					F				
15. Demonstrate interpersonal skills.											
16. Recognize the value of human diversity.											
17. Demonstrate life management skills.		F					F				

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Construction Management Technology
Methods of Formative and Summative Assessment
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Student Outcome	Methods of Formative Assessment	Methods of Summative Assessment
1. Analyze and interpret all types of construction drawings and documents.	Lab performances. Assignments. Intern experience. Written/practical exams.	Lab performance and final exam over set of drawings and specifications manual.
2. Calculate quantities of material, labor, and equipment needed for a project.	Lab performances. Assignments. Tests and quizzes. Intern experience. Lab performance in estimating.	Written exam. Lab performance on quantifying and estimating a set of drawings.
3. Analyze financial data relative to construction work in the field and office.	Lab performances. Assignments. Intern experience. Tests and quizzes.	Exam. Project submittal with project schedule and cost identified.
4. Control field operations through cost analysis and productivity analysis.	Intern experiences. Tests and quizzes. Lab performances. Computer costing on schedule.	Exam. Project submittal with schedule and costs identified.
5. Apply data analysis to identify construction problems, specify goals, and execute projects.	Intern experiences. Lab performances. Tests and quizzes. Assignments.	Exam.
6. Utilize the critical path and Gantt bar chart methods to organize complex construction projects.	Intern experiences. Lab performances on computer. Tests and quizzes. Computer scheduling.	Exam. Project with fenced bar chart done through Primavera scheduling.
7. Identify and understand the major elements in construction labor and contract law.	Test and quizzes. Assignments. In class projects.	Exam.
8. Operate and use microcomputers, pre-packaged project management software, 35 mm camera, scan machine and time-lapse projector.	Lab performances. Computer usage. 35mm camera usage.	Major project due on productivity and scheduling of construction projects.
9. Stake out control points for projects using modern laser surveying equipment.	Lab performances utilizing laser equipment. Tests and quizzes. Intern experience. Class assignment.	Exam. Final lab practicum. Lab performance.

Construction Management Technology
Methods of Formative and Summative Assessment
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Student Outcome	Methods of Formative Assessment	Methods of Summative Assessment
10. Assist in developing marketing tools and objectives to increase the sales of no-bid jobs for their employers.	In-class projects. Use of 35mm camera for project. Tests and quizzes.	Major slide project presentation in written and oral format. Exam.
11. Assist in purchasing or safety/loss control of equipment and materials.	In-class presentations. Tests and quizzes. Assignments. Intern experiences.	Exam. Lab performance.
12. Apply bid strategies to marketing proposals for building and heavy construction type projects.	Lab performance in estimating. Assignments in take-off and costing projects. Tests and quizzes.	Exam. Lab performances.
13. Assist in resolving construction disputes, claims and arbitration/litigations.	Tests and quizzes. Assignments. In-class projects.	Exam. Lab performances.
14. Think critically	Written exercises. Negotiations problems. Short answer and essay quizzes.	Exam with essay questions with critical thinking and problem solving techniques being used.
15. Solve problems.	Labor and contract negotiation oral and written exercises. Supervisory problem solving exercise questions.	Exam using essay type questions with problem solving techniques.
16. Communicate effectively.	Class participation through the use of oral communications. Written communication exercises.	Exam using short answers, essay questions, and oral questions.
17. Demonstrate interpersonal skills.	Class team projects in various subject matter with leaders and group members learning to work with each other.	Exam Final lab practicum on a team basis.
18. Recognize the value of human diversity.	Team projects with various diverse members on each team.	Exam through final lab practicum done on diverse team basis.
19. Demonstrate life management skills.	Team leaders and group members working on various class projects.	Exam through final lab practicum done with leaders and group members.

COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ◆ LANDSCAPE MAJOR

STUDENT OUTCOMES	ENGL 101	ARCH 111	LAND 101	MATH 104	CPT 101	CHEM 100	CIVL 120	LAND 102	MATH 148	ENGL 102
1. Assist in the preparation of contract/design documents and construction specifications.		F	F	F	F		F	F	F	F
2. Assist landscape professionals in managing and implementing the construction process.			F				F	F	F	F
3. Select suitable herbaceous and woody plants and properly install the same.										
4. Estimate landscape project costs by utilizing take-off and costing methods.					F			F	F	
5. Be able to interpret plans and drawings.		F	F				F	F		
6. Assist in the survey and stake out of the job site.										
7. Create manual and/or computer generated drawings of landscape projects.					F					
8. Prepare presentation drawings using a variety of graphic techniques.				F	F			F	F	
9. Maintain both commercial and residential landscapes.										
10. Design and install irrigation systems										
Think critically.				F/S	F				F/S	F
12. Solve problems.		F	F	F/S	F	F		F	F/S	
13. Communicate effectively.	F			F					F	F
14. Demonstrate interpersonal skills.										
15. Recognize the value of human diversity.										
16. Demonstrate life management skills.				F					F	

F = FORMATIVE ASSESSMENT   S = SUMMATIVE ASSESSMENT

COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ◆ LANDSCAPE MAJOR

STUDENT OUTCOMES	BIO 125	LAND 107	LAND 105	LAND 152	LAND 207	LAND 205	LAND 206	ARCH 291	LAND 108	ENGL 204
1. Assist in the preparation of contract/design documents and construction specifications.		F	F	F	F	F	F	F/S	F	F
2. Assist landscape professionals in managing and implementing the construction process.		F	F	F	F	F		F/S	F	F
3. Select suitable herbaceous and woody plants and properly install the same.	F		F/S			F/S		F/S	F/S	
4. Estimate landscape project costs by utilizing take-off and costing methods.				F	F/S			F/S		
5. Be able to interpret plans and drawings.				F/S	F			F/S		
6. Assist in the survey and stake out of the job site.					F			F/S		
7. Create manual and/or computer generated drawings of landscape projects.				F/S	F					
Prepare presentation drawings using a variety of graphic techniques.				F	F/S		F/S	F/S		
9. Maintain both commercial and residential landscapes.		F/S						F/S		
10. Design and install irrigations systems.										
11. Think critically		F		F	F			F		F
12. Solve problems.	F	F		F/S	F		F	F		
13. Communicate effectively.		F		F/S	F		F	F		F
14. Demonstrate interpersonal skills.				F/S	F			F		
15. Recognize the value of human diversity.								F		
16. Demonstrate life management skills.								F		

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COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ♦ LANDSCAPE MAJOR

STUDENT OUTCOMES	COMM 105	HUM 1XX	LAND 202	LAND 222	SSCI 10X	SURV 141	LAND 201	LAND 203	XXX XXX
. Assist the landscape architect or the landscape contractor in designing the landscape project.	F	F/S		F				F	
2. Assist the Landscape Architect of the Landscape Contractor in controlling the construction process.			F/S	F/S		F		F	
3. Select landscape plants suitable for specific landscape situations.			S	F			F		
4. Estimate landscape projects costs by utilizing take-off and costing processes.			F	F/S					S
5. Be able to read and interpret information from landscape drawings.			F	F				F	F/S
6. Assist in survey and stake out of the job site.						F/S			
7. Create manual and computer graphic representations of orthographic and isometric landscape projects.									
8. Work with perspectives, shades and shadows, and free-hand drawing techniques to express relevant ideas graphically.			F/S						
9. Maintain both commercial and residential landscapes.							F		
Design and install irrigation systems.									
11. Think critically.			F	F	F		F		
12. Solve problems.			F/S	F/S	F		F/S	F	
13. Communicate effectively.	F/S	F	F	S	F				
14. Demonstrate interpersonal skills.		F/S		S	F/S				
15. Recognize the value of human diversity.		F/S			F/S				
16. Demonstrate life management skills.									

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COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ◆ ARCHITECTURE TECHNOLOGY

STUDENT OUTCOMES	ARCH 113	BMGT 111	LAND 152	ARCH 155	CIVL 232	ARCH 250	ARCH 212	ARCH 232	ARCH 262	ARCH 112
1. Create manual and computer graphic representations of orthographic and isometric projections.	F/S			F		F	F		S	F
2. Use geometry to solve problems with areas and intersecting surfaces and lines.	F/S		F/S	F						
3. Work with one- and two-point perspectives, shades and shadows, and free-hand drawing techniques to express relevant ideas graphically.									F/S	
4. Generate and organize schedules and details within a complete set of architectural working drawings.				F		F				
5. Research materials, consult with industry experts, and use CSI standards to create a set of specifications to support the architectural drawings.				F		F/S		F		
6. Read and interpret information from architectural drawings for the estimating and bidding process.			F	F		F	F			F
7. Use building construction standards and codes to ensure that architectural drawings comply with legal and safety guidelines.				F		F	F	S		
8. Assist the architect in solving and drawing structural details by referring to information on statics/strength of materials, basic knowledge of wood structures, and steel and concrete hand books/reference materials.				F/S	F	F				
9. Create isometric layouts of basic mechanical systems employed in commercial buildings.							F/S			
10. Recognize and understand architectural style and historical heritage.				F						
11. Develop site plan layouts.	F		F/S							
12. Think critically.			F				F		F	F
13. Solve problems.	F	F	F	F	F	F	F		F	F
14. Communicate effectively.									F	
15. Demonstrate interpersonal skills.			F							
16. Recognize the value of human diversity.										
17. Demonstrate life management skills.										

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Architecture Technology
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NOTE: The following student outcomes reflect changes made after the assessment process and advisory meeting. Outcomes have been adjusted to reflect this work.

Student Outcome	Methods of Formative Assessment	Methods of Summative Assessment
1. Assist in the preparation of contract/design documents and construction specifications.	Lab performance Project submittal Assignments Intern experience Written/practical exams	Lab performance and preparation of working drawings. Written exams and final projects.
2. Assist landscape professionals in managing and implementing the construction process.	Lab performance Tests and quizzes Intern observations	Written exams and final projects Lab performances in design/build
3. Select suitable herbaceous and woody plants and properly install the same.	Intern experience Tests and quizzes on morphology Design lab performance Identification labs	Exam Final lab Major design projects submittal
4. Estimate landscape project costs by utilizing take-off and costing methods.	Intern experience Tests and quizzes Class assignments Assignments in take-off Costing schedules Lab performance in estimating	Exam Major Project of working drawings with estimates
5. Be able to interpret plans and drawings.	Class assignments Lab performance Tests and quizzes Take home assignments Intern experience	Major projects Intern experience Exam in document drawings
6. Assist in the survey and stake out of the job site.	Lab performance Tests and quizzes Intern experience Class assignments	Lab performance Final lab practicum Exams
7. Create manual and/or computer generated drawings of landscape projects.	Land performance In class projects Quizzes and tests	Lab performance Final design working drawings Portfolio
8. Prepare presentation drawings using a variety of graphic techniques.	Lab performance Tests and quizzes Intern experience In class projects	Major projects Exam Portfolio

Architecture Technology
Landscape Major
Methods of Formative and Summative Assessment
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Student Outcome	Methods of Formative Assessment	Methods of Summative Assessment
9. Maintain both commercial and residential landscapes.	Lab performance Quizzes and tests In class practicums Intern experience	Lab practicums Exams
10. Design and install irrigation systems.	Lab performance Tests and quizzes Intern experience	Portfolio Exams Lab practicum Final design projects
11. Think critically.	Lab performance Project evaluation Tests	Projects Exams Presentations Labs
12. Solve problems	Lab performance Tests/quizzes Projects Intern	Intern Tests and quizzes Projects Intern Lab
13. Communicate effectively	Group projects	Project presentation
14. Demonstrate interpersonal skills.	Group projects	Sales presentation Lab Project Presentation
15. Recognize the value of human diversity.		
16. Demonstrate life management skill.	Internships	Internships

Columbus State Community College
Assessment Matrix - Electronic Engineering Technology

STUDENT OUTCOMES	ENGL 101	MATH 111	EET 110	EET 111	EET 112	ENGL 102	MATH 112	PHYS 181	EET 120	EET 121	ENGL 204	COMM 105	MATH 113	EET 130	EET 131	EET 132	EET 241	EET 243	EET 240	EET 242	EET 244	PHYS185	EET 250	EET 251	EET 252	EET 253	EET 254	HUM 1xx	EET 260	EET 261	EET xxx	SSCI 10x
1. Apply technical terms in their proper context when writing or speaking.	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F		S			F
2. Analyze and locate problems in basic electronic circuits				F	F					F				F	F	F	F			F	F		F	F			F			S		
3. Demonstrate knowledge of a basic approach to troubleshooting.		F		F	F		F	F		F			F	F	F	F	F			F	F	F	F	F			F			S		F
4. Read and interpret engineering specifications.		F	F	F	F		F		F	F	F		F	F	F	F	S	F	F	F			F	F	F	F	F		F/S	F/S		
5. Measure electrical quantities (e.g. voltage, current, resistance, frequency, etc.) accurately and draw conclusions.				F	F					F					F					F	F	F	S	S	F					S		
6. Collect, compile, and graph experimental data.	F	F	F		F	F	F	F		F	F	F	F		F					F	F	F	F	F		F				S		F
7. Write technical reports.	F			F	F	F		F		F	F/S				F					F	F	F	F	F						S		F
8. Program calculators and computers.				F	F			F	F					F	F		F			F			F	F		F			S	S		
9. Prepare electronic schematics using manual and computer-aided systems.			S	F	F																		F	F			F					
10 Analyze and interpret circuit diagrams.				F	F				F	F				F	F	F	F	F		F			F	F	F		F		S	S		
11. Apply a knowledge of the basics of electronics to a variety of applications the graduates will see as they work in the profession.		F		F	F		F						F		F	F	F		F	F		F	S	S	F		F		S	S		
1 Think critically.	F	F/S		F	F	F	F/S	F	F	F	F	F		F	F	F	F	F	F/S	F	F	F	F	F	F		F	F	F/S	F/S		F/S
2. Solve problems.	F	F/S	F	F	F	F	F/S	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	F	F		S					F/S
3. Communicate effectively.	F	F	F	F	F	F	F	F		F	F	F	F							F	F	F	F/S	F	F/S			F		S	F	F/S
4. Demonstrate interpersonal skills.	F					F		F		F	F	F										F		F	F	F/S						F
5. Recognize the value of human diversity.	F					F				F	F	F							F									F	F			F/S
6. Demonstrate life management skills.	F		F	F	F	F			F	F	F	F				F		F	F	F	F		F			F			S	S	F	F

F = FOR IVE ASSESSMENT
S = SUM IVE ASSESSMENT

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Assessment Matrix - Electronic Engineering Technology | Computer Electronics Major

STUDENT OUTCOMES	MATH 121	CPT 105	ENGL 101	PHIL 150	MATH 111	CPT 108	EET 111	EET 112	ENGL 102	EET 110	MATH 112	CPT 111	EET 120	EET 121	ENGL 204	CPT 231	EET 130	EET 131	EET 132	PHY 181	EET 241	EET 242	CPT 251	EET 243	EET 244	EET 254	SSCI 10X	EET 145	HUM 1XX	COM 105	CPT 131
1 Apply technical terms in their proper context when writing or speaking	F		F		F		F	F	F	F	F		F	F	F/S		F	F	F	F	F	F		F		F	F	F		F	F
2 Analyze and locate problems in basic electronic circuits							F	F						F			F	F	F		S	S			F	F					
3 Demonstrate knowledge of a basic approach to troubleshooting	F				F		F	F			F			F			F	F	F	F	F	S		F	F	F	F	F			
4 Read and interpret engineering specifications					F		F	F		F	F		F	F	F		F	F	F		S	S				F					
5 Measure electrical quantities (e.g. voltage, current, resistance, frequency, etc.) accurately and draw conclusions							F	F						F				F				S			F			F			
6 Collect, compile, and graph experimental data	F		F		F			S	F	F	F			F	F			F		F		F			F			F		F	
7 Write technical reports			F				F	F	F					F	F/S			F		F		F			F						
8 Program calculators and computers							F	F					F				F	F		F	S	F				F					
9 Prepare electronic schematics using manual and computer-aided systems							F	F		S																					
10 Analyze and interpret circuit diagrams							F	F					F	F			F	F	F		S	S		F				F			
11 Apply a knowledge of the basics of electronics to a variety of applications the graduates will see as they work in the profession					F		F	F		F							F	F	F		S	S						F			
12 Write, debug, test, maintain and document programs in IBM Assembly and C Language programs									F			F			F	F/S							F/S								
13 Write Job Control Language (JCL) necessary to execute typical business applications on an IBM mainframe computer using DOS/VSE									F						F																
14 Use a terminal in an on-line environment (ADR/VOLLIE)				F					F			F			F	S							F/S								F/S
15 Use word processing (WordPerfect), spreadsheet (LOTUS 123), database (dBASEIII Plus), and graphic software available for the IBM PC and local area networks		F		F					F						F																
1 Think critically	F/S		F	F	F/S		F	F	F		F/S		F	F	F		F	F	F	F	F	F		F	F	F	F/S	F	F	F	
2 Solve problems	F/S		F	F	F/S		F	F	F	F	F/S		F	F	F		F	F	F	F	F	F		F	F	S	F/S	F		F	
3 Communicate effectively	F		F	F	F		F	F	F	F	F			F	F					F		F			F		F/S	F	F	F	
4 Demonstrate interpersonal skills			F					F	F					F	F					F							F	F		F	
5 Recognize the value of human diversity			F						F					F	F												F/S	F	F	F	
6 Demonstrate life management skills			F				F	F	F	F			F	F	F				F			F		F	F		F	F		F	

F = FORM ASSESSMENT
S = SUM ASSESSMENT

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ELECTRONIC ENGINEERING TECHNOLOGY
METHODS OF FORMATIVE AND SUMMATIVE ASSESSMENT

Student Outcomes	Methods of Formative Assessment	Methods of Summative Assessment
1. Apply technical terms in their proper context when writing or speaking.	Submit lab write up sheet intro & conclusions. Written reports. Written exams. Written lab reports. Oral presentations	Formal reports. Oral presentations.
2. Analyze and locate problems in basic electronic circuits.	Submit lab sheets with answers. Written lab reports. Laboratory/circuit Troubleshooting Actual task performance.	Laboratory troubleshooting Written tests. Proficient with test equipment
3. Demonstrate knowledge of a basic approach to troubleshooting.	Submit lab sheets with answers. Construction of assigned lab projects. Fault simulation Laboratory troubleshooting Actual project fabrication. Written exams	Laboratory troubleshooting Computer simulation. Test equipment used proficiently
4. Read and interpret engineering specifications.	Written tests. Actual task performance Written exams Project fabrication. Procedural lab reports.	Actual task performance. Use of tech data sheets.
5. Measure electrical quantities (e.g., voltage, current, resistance, frequency, etc.) accurately and draw conclusions.	Perform lab & submit sheets. Written tests. Measure/compare calculated vs measured values. Use of "Proto Lab" program. Actual task performance.	Lab performance in advance courses. Actual task performance Computer simulation. System conceptualization
6. Collect, compile, and graph experimental data.	Submit lab sheets. Actual task performance. Lab reports.	Lab performance in advance courses. Written test Written lab reports. Measure/compare actual vs theoretical value.
7. Write technical reports.	Submit small reports throughout course. Written lab reports. Lab conclusions. Log books	Submit comprehensive formal report in advanced courses. Extensive written research report. Written reports. Project writeups

ELECTRONIC ENGINEERING TECHNOLOGY
METHODS OF FORMATIVE AND SUMMATIVE ASSESSMENT

Student Outcomes	Methods of Formative Assessment	Methods of Summative Assessment
8. Program calculators and computers.	Require proficiency with TI-85 calculators. Lab reports Assigned term project.	Written exams in advanced courses. Individual lab sheets. Assessment of final project/exam in the microprocessor course
9. Prepare electronic schematics using manual and computer aided systems.	Use of "Proto Lab" program. Actual task performance PC board layout.	Proper documentation and use of conventions in project/lab writeups
10. Analyze and interpret circuit diagrams.	Submit lab sheets. Written tests Lab assignments. Troubleshooting problems Explain circuit operation. Lab performance of tasks.	Written exams. Reverse engineering of electronic systems.
11. Apply a knowledge of the basics of electronics to a variety of applications the graduates will see as they work in the profession.	Written tests. Lab assignments. Perform as field service Perform assembly tasks. Written exams. Lab reports.	On the job evaluation. Employer evaluations. Graduate follow-up. Transfer articulation

ELECTRONIC ENGINEERING TECHNOLOGY
METHODS OF FORMATIVE AND SUMMATIVE ASSESSMENT

Student Outcomes General Education	Methods of Formative Assessment	Methods of Summative Assessment
1. Think Critically	Write technical reports. Review data sheets and select components.	Oral presentation. Actual Task Performance. Establish a safe work environment.
2. Solve Problems	Task performance. Written and oral quizzes.	Project write up. Comprehensive exams. Job Placement.
3. Communicate Effectively	Written and oral reports.	Written and oral reports.
4. Demonstrate Interpersonal Skills.	Work together as team members.	Shared responsibility and reward.
5. Recognize the value of human diversity.	Review of expectation, standards and conventions within the electronics industry.	Job placement.
6. Demonstrate life management skills.	Evaluate student's management of priorities. Review of articulation opportunities.	Resume preparation. Job search and selection.

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ELECTRONIC ENGINEERING TECHNOLOGY DEPARTMENT

METHODS USED TO DETERMINE SUMMATIVE ACHIEVEMENT

1. SUCCESS ON INTERVIEWS

2. GRADUATE FOLLOW UP REPORTS

3. COMPATIBILITY DESIRABILITY AS A LAB PARTNER

4. INFORMAL PERSONAL CONTACTS

5. THE DICTIONARY GIVES ONE DEFINITION OF ACHIEVEMENT AS "A HEROIC ACT OR DEED". WHAT IS HEROIC FOR ONE (GETTING TO CLASS ON TIME EVERY DAY FOR A WEEK) MIGHT BE CONSIDERED ROUTINE BY ANOTHER. WE NEED MORE DIRECTION ON WHAT IS EXPECTED, AND WHY WE ARE NOW ADDING SUMMATIVE ACHIEVEMENT.

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REVISED JUNE 1997

Columbus State Community College
Assessment Matrix - Electronic Engineering Technology

STUDENT OUTCOMES	ENGL 101	MATH 111	EET 110	EET 111	EET 112	ENGL 102	MATH 112	PHYS 181	EET 120	EET 121	ENGL 204	COMM 105	MATH 113	EET 130	EET 131	EET 132	EET 241	EET 243	EET 240	EET 242	EET 244	PHYS185	EET 250	EET 251	EET 252	EET 253	EET 254	HUM 1xx	EET 260	EET 261	EET xxx	SSCI 10x
1. Apply technical terms in their proper context when writing or speaking.	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F		S			F
2. Analyze and locate problems in basic electronic circuits				F	F					F				F	F	F	F			F	F		F	F			F			S		
3. Demonstrate knowledge of a basic approach to troubleshooting.		F		F	F		F	F		F			F	F	F	F	F			F	F	F	F	F			F			S		F
4. Read and interpret engineering specifications.		F	F	F·	F		F		F	F	F		F	F	F	F	F	F	F	F			F	F	F	F	F		F/S	F/S		
5. Measure electrical quantities (e.g. voltage, current, resistance, frequency, etc.) accurately and draw conclusions.				F	F					F					F					F	F	F	S	S	F					S		
6. Collect, compile, and graph experimental data.	F	F	F		F	F	F	F		F	F	F	F		F					F	F	F	F	F		F				S		F
7. Write technical reports.	F			F	F	F		F		F	F/S				F					F	F	F	F	F						S		F
8. Program calculators and computers.				F	F			F	F					F	F		F			F			F	F		F			S	S.		
9. Prepare electronic schematics using manual and computer-aided systems.			S	F	F																		F	F			F					
10.Analyze and interpret circuit diagrams.				F	F				F	F				F	F	F	F	F		F			F	F	F		F		S	S		
11. Apply a knowledge of the basics of electronics to a variety of applications the graduates will see as they work in the profession.		F		F	F		F						F		F	F	F		F	F		F	S	S	F		F		S	S		
1.Think critically.	F	F/S		F	F	F	F/S	F	F	F	F	F		F	F	F	F	F	F/S	F	F	F	F	F	F		F	F	F/S	F/S		F/S
2. Solve problems.	F	F/S	F	F	F	F	F/S	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	F	F		S					F/S
3. Communicate effectively.	F	F	F	F	F	F	F	F		F	F	F	F							F	F	F	F/S	F	F/S			F		S	F	F/S
4. Demonstrate interpersonal skills.	F					F		F		F	F	F										F		F	F	F/S						F
5. Recognize the value of human diversity.	F					F				F	F	F							F									F	F			F/S
6. Demonstrate life management skills.	F		F	F	F	F			F	F	F	F				F		F	F	F	F		F			F			S	S	F	F

F = FORMATIVE ASSESSMENT
S = SUMMATIVE ASSESSMENT

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ELECTRONIC ENGINEERING TECHNOLOGY
METHODS OF FORMATIVE AND SUMMATIVE ASSESSMENT

Student Outcomes	Methods of Formative Assessment	Methods of Summative Assessment
1. Apply technical terms in their proper context when writing or speaking.	Submit lab write up sheet intro & conclusions. Written reports. Written exams. Written lab reports. Oral presentations	Formal reports. Oral presentations.
2. Analyze and locate problems in basic electronic circuits.	Submit lab sheets with answers. Written lab reports. Laboratory/circuit Troubleshooting Actual task performance.	Laboratory troubleshooting Written tests. Proficient with test equipment
3. Demonstrate knowledge of a basic approach to troubleshooting.	Submit lab sheets with answers. Construction of assigned lab projects. Fault simulation Laboratory troubleshooting Actual project fabrication. Written exams	Laboratory troubleshooting Computer simulation. Test equipment used proficiently
4. Read and interpret engineering specifications.	Written tests. Actual task performance Written exams Project fabrication. Procedural lab reports.	Actual task performance. Use of tech data sheets.
5. Measure electrical quantities (e.g., voltage, current, resistance, frequency, etc.) accurately and draw conclusions.	Perform lab & submit sheets. Written tests. Measure/compare calculated vs measured values. Use of "Proto Lab" program. Actual task performance.	Lab performance in advance courses. Actual task performance Computer simulation. System conceptualization
6. Collect, compile, and graph experimental data.	Submit lab sheets. Actual task performance. Lab reports.	Lab performance in advance courses. Written test Written lab reports. Measure/compare actual vs theoretical value.
7. Write technical reports.	Submit small reports throughout course. Written lab reports. Lab conclusions. Log books	Submit comprehensive formal report in advanced courses. Extensive written research report. Written reports. Project writeups

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ELECTRONIC ENGINEERING TECHNOLOGY
METHODS OF FORMATIVE AND SUMMATIVE ASSESSMENT

Student Outcomes	Methods of Formative Assessment	Methods of Summative Assessment
8. Program calculators and computers.	Require proficiency with TI-85 calculators. Lab reports Assigned term project.	Written exams in advanced courses. Individual lab sheets. Assessment of final project/exam in the microprocessor course
9. Prepare electronic schematics using manual and computer aided systems.	Use of "Proto Lab" program. Actual task performance PC board layout.	Proper documentation and use of conventions in project/lab writeups
10. Analyze and interpret circuit diagrams.	Submit lab sheets. Written tests Lab assignments. Troubleshooting problems Explain circuit operation. Lab performance of tasks.	Written exams. Reverse engineering of electronic systems.
11. Apply a knowledge of the basics of electronics to a variety of applications the graduates will see as they work in the profession.	Written tests. Lab assignments. Perform as field service Perform assembly tasks. Written exams. Lab reports.	On the job evaluation. Employer evaluations. Graduate follow-up. Transfer articulation

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ELECTRONIC ENGINEERING TECHNOLOGY
METHODS OF FORMATIVE AND SUMMATIVE ASSESSMENT

Student Outcomes General Education	Methods of Formative Assessment	Methods of Summative Assessment
1. Think Critically	Write technical reports. Review data sheets and select components.	Oral presentation. Actual Task Performance. Establish a safe work environment.
2. Solve Problems	Task performance. Written and oral quizzes.	Project write up. Comprehensive exams. Job Placement.
3. Communicate Effectively	Written and oral reports.	Written and oral reports.
4. Demonstrate Interpersonal Skills.	Work together as team members.	Shared responsibility and reward.
5. Recognize the value of human diversity.	Review of expectation, standards and conventions within the electronics industry.	Job placement.
6. Demonstrate life management skills.	Evaluate student's management of priorities. Review of articulation opportunities.	Resume preparation. Job search and selection.

COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ◆ ELECTRO-MECHANICAL TECHNOLOGY

STUDENT OUTCOMES	MECH 243	EMEC 250	ENGL 204	HUM 1XX	EMEC 251	MATH 135	SSCI 10X	MECH 240	EMEC 260	MECH 260
1. Read and interpret engineering drawings.			F							F
2. Select an appropriate electric motor and control based on known functional requirements.		F/S	F		F				F	
3. Identify and troubleshoot hydraulic and pneumatic systems.	F		F					F	F	F
4. Troubleshoot electric motors.		S	F							
5. Identify and select electro-mechanical components for typical industrial requirements.	F		F		F/S			F	S	F
6. Select and use appropriate power control devices, timers, transducers, and sensors.	F		F		F/S				S	
7. Apply servo-mechanisms with regard to accuracy, overshoot, and stability of automated equipment.	F		F		F	F			S	
8. Identify closed-loop and open-loop systems and select the type of control required to achieve a given system response.			F		F/S				F/S	F
9. Demonstrate skill in applying programmable controllers to operate simple processes.			F		F				S	
10. Perform preventive and corrective maintenance on electro-mechanical automated systems.			F		F				S	
1. Think critically.		F		F	F	F/S	F		S	
2. Solve problems.		F			F	F/S		F	S	F
3. Communicate effectively.		F	F		F	F			S	
4. Demonstrate interpersonal skills.				F	S		F		S	
5. Recognize the value of human diversity.				F	S	F	F		S	
6. Demonstrate life management skills.					S		F		S	

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COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ◆ ELECTRO-MECHANICAL TECHNOLOGY

STUDENT OUTCOMES	QUAL 240	ENGL 102	EET 130	EET 132	EET 131	MECH 120	MECH 131	COMM 105	PHYS 183	EET 243	EET 244
1. Read and interpret engineering drawings.		F				S		F			
2. Select an appropriate electric motor and control based on known functional requirements.		F	F	F	F			F	F	F	F
3. Identify and troubleshoot hydraulic and pneumatic systems.		F					S	F	F		
4. Troubleshoot electric motors.		F						F			
5. Identify and select electro-mechanical components for typical industrial requirements.		F	F	F	F			F	F	F	F
6. Select and use appropriate power control devices, timers, transducers, and sensors.		F	F	F	F			F		F	F
7. Apply servo-mechanisms with regard to accuracy, overshoot, and stability of automated equipment.		F						F			
8. Identify closed-loop and open-loop systems and select the type of control required to achieve a given system response.		F	F	F	F			F		F	F
9. Demonstrate skill in applying programmable controllers to operate simple processes.		F						F			
10. Perform preventive and corrective maintenance on electro-mechanical automated systems.		F				F		F	F		
1. Think critically.						F			F		
2. Solve problems.	F					F			F		
3. Communicate effectively.	F	F						F			
4. Demonstrate interpersonal skills.	F						F				
5. Recognize the value of human diversity.											
6. Demonstrate life management skills.											

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COLUMBUS STATE COMMUNITY COLLEGE
ASSESSMENT MATRIX ◆ ELECTRO-MECHANICAL TECHNOLOGY

STUDENT OUTCOMES	ENGL 101	MATH 111	EET 111	EET 112	MECH 110	EET 109	MATH 112	PHYS 181	EET 120	EET 121	QUAL 120
1. Read and interpret engineering drawings.	F	F			F		F				
2. Select an appropriate electric motor and control based on known functional requirements.	F	F	F	F			F	F	F	F	
3. Identify and troubleshoot hydraulic and pneumatic systems.	F	F					F				
4. Troubleshoot electric motors.	F	F					F				
5. Identify and select electro-mechanical components for typical industrial requirements.	F	F	F	F			F	F	F	F	
6. Select and use appropriate power control devices, timers, transducers, and sensors.	F	F	F	F			F		F	F	
7. Apply servo-mechanisms with regard to accuracy, overshoot, and stability of automated equipment.	F	F					F				
8. Identify closed-loop and open-loop systems and select the type of control required to achieve a given system response.	F		F	F			F		F	F	
9. Demonstrate skill in applying programmable controllers to operate simple processes.	F	F					F				
10. Perform preventive and corrective maintenance on electro-mechanical automated systems.	F	F			F		F	F			
1. Think critically.		F/S	F	F	F		F/S	F	F	F	F
2. Solve problems.		F/S	F	F	F		F/S	F	F	F	F
3. Communicate effectively.	F	F	F	F			F		F	F	F
4. Demonstrate interpersonal skills.											
5. Recognize the value of human diversity.											
6. Demonstrate life management skills.											

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Mechanical Engineering Technology
Program Outcomes

Program Outcomes	Intro to Mfg	Mfg Proc	Comp Appl	Draft I	Statics	Hydraulics	Mach Tools	Draft II	Str Matls	Robotics	SPC	Matls Sci	CAD I	Comp Prog	NC/CNC	Basic Mech	Mach Des	CAD II	CAM	TQM	English	English	English	Speech	MATH I	MATH II	MATH III	Physics	Electrical	Digital	Beh Sci	Human
	MECH 110	MECH 111	MECH 112	MECH 120	MECH 130	MECH 131	MECH 240	MECH 241	MECH 242	MECH 243	MECH 244	MECH 250	MECH 251	MECH 252	MECH 253	MECH 290	MECH 291	MECH 292	MECH 293	QUAL 240	ENGL 101	ENGL 102	ENGL 204	COMM 105	MATH 111	MATH 112	MATH 113	PHYS 181	EET 1?1	EET 1?2	SSCI XXX	HU XXX
ply basic knowledge of manufacturing and engineering technology, edures, symbols, and graphics skills to the reading and production etches, drawings, blueprints and specifications, assist in establishing tolerances ed to production, by utilizing manual and/or computerized methods	F	F		F				F/S					F					F/S			F	F	F	F	F	F	F					
e significant contributions to the production of manufactured goods by utilizing and knowledge of drafting, computers and automation technology, sound facturing practices, quality measures, machine capabilities/limitations, and assist selection of production equipment.	F	F/S	F				F/S			F	F			F/S	F				F/S		F	F	F	F	F	F	F					
tribute to the solution of engineering and design problems involving mechanical ns, by utilizing knowledge and skills in electrical and mechanical principles, material mance and selection, basic machine elements, sound design and engineering es. Apply computers and computer language to the solution of engineering problems	F		F	F	F	F		F	F			F		F		F	F/S				F	F	F	F	F	F	F	F	F	F		
e various quality tools and techniques such as SPC and TQM to support tion in the manufacturing area and other applicable work situations to improve d all quality measures											F/S									F/S	F	F	F	F	F	F						
Critically					F				F																F/S	F/S	F/S	F	F	F	F	F
Problems					F				F		F			F			F			F					F/S	F/S	F/S	F	F	F		
unicate Effectively																				F	F	F	F	F	F	F	F					
strate Interpersonal Skills																				F											F	F
nize the Value of Human Diversity																															F	F
strate Life Management Skills																															F	

F - Formative assessment
S - Summative assessment

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Columbus State Community College
Assessment Matrix - Graphic Communications Technology

Revised 8/26/97

STUDENT OUTCOMES	GRPH110	GRPH111	GRPH112	ENGL101	MATH102	GRPH122	GRPH125	PHYS100	ENGL102	GRPH130	GRPH131	GRPH132	BMGT101	COMM105	GRPH241	GRPH242	GRPH243	BMGT111	ENGL204	GRPH244	GRPH251	ACCT101	SSCI10X	GRPH140	HUM 1XX	GRPH270	GRPH271	GRPH273	GRPH274	GRPH278	GRPH279	GRPH281	GRPH282	GRPH283
1. Specify type styles and sizes, coordinate colors, and employ the elements of design to communicate effectively.	F						F				F/S										F							F/S					F	F
2. Prepare camera-ready mechanicals (including multicolor overlays) that reflect a wide range of employment situations.							F			F/S						F												F/S	F/S					
3. Prepare flats or image carriers for single and multicolor work; prepare proofs for single and multiple color designs.										F/S		F																	F/S					
4. Operate a 35 mm camera, process the film, make enlargements, and perform general darkroom and photo lab duties.		F/S			F			F																		F/S	F/S			F/S		F/S		
5. Calibrate a lithographic for proper exposure, develop film, operate film processors, read densitometers, and adjust density range on halftones.					F			F		F/S						F													F/S					
6. Operate computer-controlled typesetting equipment, format and tabulate copy, and store and retrieve information in disks.			F			F																											F/S	F/S
7. Operate single and multicolor offset presses safely and demonstrate knowledge of cylinder packing procedures and fountain chemical solutions.	F									F/S																								
8. Demonstrate knowledge of various text generating computer graphic technolog8ies and equipment, and relate them to local industry trends.						F				F/S		F									F/S												F/S	F/S
9. Use communication skills (verbal, written, and graphic) to interact effectively with clients, co-workers, and others in the work environment.				F					F				F	F			F/S	F	F	F		F	F	F	F	F	F	F	F	F	F/S	F	F	F/S
10. Demonstrate the ability to manage and evaluate print production operations, including estimating the cost of a production order, analyzing specifications and production data to assign time and personnel to specific jobs, and applying a working knowledge of the graphics industry to the operation of the business					F							F	F		F			F	F	F		F		F/S				F/S			F/S			F/S

F = FORMATIVE ASSESSMENT
S = SUMMATIVE ASSESSMENT

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Columbus State Community College
Assessment Matrix Graphic Communications Technology

Revised 8/26/97

STUDENT OUTCOMES	GRPH110	GRPH111	GRPH112	ENGL101	MATH102	GRPH122	GRPH125	PHYS100	ENGL102	GRPH130	GRPH131	GRPH132	BMGT101	COMM105	GRPH241	GRPH242	GRPH243	BMGT111	ENGL204	GRPH244	GRPH251	ACCT101	SSCI10X	GRPH140	HUM 1XX	GRPH270	GRPH271	GRPH273	GRPH274	GRPH278	GRPH279	GRPH281	GRPH282	GRPH283
1.Think critically.	F	F	F	F	F/S	F	F	F	F	F	F		F	F	F		F	F	F	F	F	F	F/S	F	F	F	F	F	F	F	F	F	F	F
2. Solve problems.	F	F		F	F/S	F	F	F	F	F	F		F	F	F	F		F	F	F	F	F	F			F	F	F	F	F	F	F	F	F
3. Communicate effectively.				F		F		F	F			F	F	F			F	F	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F
4. Demonstrate interpersonal skills.	F			F					F				F	F			F	F	F	F	F		F/S			F	F	F		F	F	F	F	F
5. Recognize the value of human diversity.				F					F				F	F				F	F	F	F		F/S		F			F						F
6. Demonstrate life management skills.				F					F				F	F					F		F		F	F										

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F = FORMATIVE ASSESSMENT
S = SUMMATIVE ASSESSMENT

GRAPHIC COMMUNICATIONS TECHNOLOGY
METHODS OF FORMATIVE AND SUMMATIVE ASSESSMENT

Student Outcomes	Methods of Formative Assessment	Methods of Summative Assessment
1. Specify type styles and sizes, coordinate colors, and employ the elements of design to communicate effectively.	Written examination Proficiency exam Practical examination	Actual task performance Written examination
2. Prepare camera-ready mechanicals (including multicolor overlays) that reflect a wide range of employment situations.	Written examination Practical examination	Actual task performance Written examination
3. Prepare flats or image carriers for single and multicolor work; prepare proofs for single and multiple color designs.	Written examination Practical examination	Actual task performance Portfolio
4. Operate a 35 mm camera, process the film, make enlargements, and perform general darkroom and photo lab duties.	Written examination Task performance	Portfolio Summary project
5. Calibrate a lithographic camera for proper exposure, develop film, operate film processors, read densitometers, and adjust density range on halftones.	Written examination Practical examination Task performance	Actual task performance Summary project Portfolio
6. Operate computer-controlled typesetting equipment, format and tabulate copy, and store and retrieve information in disks.	Written examination Computer simulation	Summary project
7. Operate single and multicolor offset presses safely and demonstrate knowledge of cylinder packing procedures and fountain chemical solutions.	Written examination Practical examinations	Actual task performance
8. Demonstrate knowledge of various text-generating computer graphic technologies and equipment, and relate them to local industry trends.	Written examination Oral reports Practical examination	Actual task performance Summary project Research paper
9. Use communication skills (verbal, written, and graphic) to interact effectively with clients, co-workers, and others in the work environment.	Written examination Research paper Oral examination	Written examination
10. Demonstrate the ability to manage and evaluate print production operations, including estimating the cost of a production order, analyzing specifications and production data to assign time and personnel to specific jobs, and applying a working knowledge of the graphics industry to the operation of the business	Written examination Research paper	Written examination Comprehensive examination actual task performance

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GRAPHIC COMMUNICATIONS TECHNOLOGY
METHODS OF FORMATIVE AND SUMMATIVE ASSESSMENT

General Education Outcomes	Methods of Formative Assessment	Methods of Summative Assessment
11. Think critically	Written exams Practical exams	Task performance
12. Solve problems	Written exams Practical Exams	Practical exams Task performance
13. Communicate effectively	Oral reports Written exams Practical exams	Research paper Summary project Task performance
14. Demonstrate interpersonal skills	Group and team projects	Team projects Task performance
15. Recognize the value of human diversity	Group and team projects	Team projects Task performance
16. Demonstrate life management skills	Research paper Practical exams	Research paper Portfolio

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OU-Lancaster

Industrial Technology

Design Option

In addition to the **General Requirements** of:

Principals of Chemistry I and II
Freshman Composition
Fund. Of Public Speaking
Algebra
Introduction to Calculus
Introduction to Physics I and II
General Psychology
Humanities or Social Science

The **Technical Requirements** are:

Basic Electronics

- Introductory knowledge of electricity and solid state electronics
- Basic electronic terms, units, symbols, schematics, and code.
- Fundamentals of alternating current and direct current electricity
- Ohm's Law applied to a series and parallel networks
- Inductance and capacitance theory
- Test equipment used for troubleshooting
- Fundamentals of solid state theory and application
- Operating characteristics of diodes, transistors and I.C.s
- Introduction to computers and microprocessors

Engineering Drawing I

- Basic Theory and practice in engineering drawing
- Geometric Construction,
- Orthographic projection
- Dimensioning
- Auxiliary
- Section
- Pictorial views
- Includes computer aided drafting

Engineering Drawing II

- Theory and practice of constructing three dimensional geometric models using CAD
- Includes geometric dimensioning and tolerancing and fasteners
- Preparation of detail and assembly drawings using 3-D CAD software

Metal Fabrication

- Theory and practice of metal fabrication including the separation, forming and assembly of sheet metal.
- Lab activities emphasize features possible in sheet metal product and the machines and tools required to provide those features

Basic Metal Machining

- Study and application of basic machining processes used in manufacturing
- Machine tool setup
- Operating procedures
- Metal cutting parameters
- Machine tool capabilities
- Precision measurement and introduction to computer numerical control

Basic Hydraulics

- Application of hydraulic principles to common industrial control circuits
- Maintenance of hardware and circuitry

Materials

- Applications of materials used in manufacturing and design
- Metallic structure alloys
- Heat treating
- Comparative properties of metals, plastics, and ceramics
- Processing effects
- Testing methods
- Coatings
- Lubricants

Intro to Mfg. Processes

- Industrial materials and processes
- Current process applications for consumer products
- Forming (applied to variety of industrial materials)
- Separating (applied to variety of industrial materials)

Design Option Requirements:

Computer Aided Drawing

- Introduction to use of computers for making engineering drawings
- Software for personal computers to create multi-view drawings of machine parts

Engineering Mechanics I

- Basic static's and dynamics

- Vectors
- Newton's Laws
- Trusses
- Frames
- Machines
- Friction
- Moments of inertia
- Particle kinematics and kinetics
- Work-energy
- Impulse-momentum

Engineering Mechanics II
- Introduction to strength of materials
- Axial, torsional and flexural loadings
- Plane stresses
- Beams
- Columns
- Deflections
- Statically indeterminate systems
- Testing methods

Machine Design
- Design of machine elements:
- Shaft, brakes, clutches, belts, couplings, bearings, springs, gears, fasteners, splines, and keys.
- Stresses in machine parts
- Material application

Tool Design
- Basic jig and fixture design
- Relation to manufacturing processes
- Material requirements
- Introduction to the die design
- Gauging
- Cutting tools
- Use of standards

Mechanisms
- Design and analysis of simple mechanisms
- Kinematics and kinetics of rigid bodies
- Graphical analysis of force
- Velocity and acceleration problems
- Linkages
- Instantaneous centers

- Gear trains
- Cams
- Rolling contact

Structural Design
- Design of structural components in buildings
- Foundations
- Connections
- Materials selection
- Use of industry standards

Descriptive Geometry
- Theory and practical applications of graphic solutions of problems relating to:
- Points, lines, planes, solids
- Use of 3-D CAD geometric modeling software

Industrial Technology

Manufacturing Option

In addition to the **General Requirements** of:

Principals of Chemistry I and II
Freshman Composition
Fund. Of Public Speaking
Algebra
Introduction to Calculus
Introduction to Physics I and II
General Psychology
Humanities or Social Science

The **Technical Requirements** are:

Basic Electronics

- Introductory knowledge of electricity and solid state electronics
- Basic electronic terms, units, symbols, schematics, and code.
- Fundamentals of alternating current and direct current electricity
- Ohm's Law applied to a series and parallel networks
- Inductance and capacitance theory
- Test equipment used for troubleshooting
- Fundamentals of solid state theory and application
- Operating characteristics of diodes, transistors and I.C.s
- Introduction to computers and microprocessors

Engineering Drawing I

- Basic Theory and practice in engineering drawing
- Geometric Construction,
- Orthographic projection
- Dimensioning
- Auxiliary
- Section
- Pictorial views
- Includes computer aided drafting

Engineering Drawing II

- Theory and practice of constructing three dimensional geometric models using CAD
- Includes geometric dimensioning and tolerancing and fasteners
- Preparation of detail and assembly drawings using 3-D CAD software

Metal Fabrication

- Theory and practice of metal fabrication including the separation, forming and assembly of sheet metal.
- Lab activities emphasize features possible in sheet metal product and the machines and tools required to provide those features

Basic Metal Machining

- Study and application of basic machining processes used in manufacturing
- Machine tool setup
- Operating procedures
- Metal cutting parameters
- Machine tool capabilities
- Precision measurement and introduction to computer numerical control

Basic Hydraulics

- Application of hydraulic principles to common industrial control circuits
- Maintenance of hardware and circuitry

Materials

- Applications of materials used in manufacturing and design
- Metallic structure alloys
- Heat treating
- Comparative properties of metals, plastics, and ceramics
- Processing effects
- Testing methods
- Coatings
- Lubricants

Intro to Mfg. Processes

- Industrial materials and processes
- Current process applications for consumer products
- Forming (applied to variety of industrial materials)
- Separating (applied to variety of industrial materials)

Manufacturing Option Requirements

Microeconomics

- Basic theory and economic analysis of prices, markets, production, wages, interest, rent, and profits
- Capitalistic analysis
- Production analysis

Elements of Supervision

- Concepts of modern day supervision
- Supervisor's major functions

- Development of sensitivity to human facets in management

Basic Pneumatics

- Application of compresses air control systems to common industrial control circuits
- Hardware maintenance
- Circuitry maintenance

Manufacturing I (Processes)

- Processes used in manufacturing
- Selection and plant layout requirements

Manufacturing II (Inventory, Handling, Costing)

- Inventory control
- Materials handling
- Production costs
- Storing and handling of materials

Manufacturing III (Quality Control)

- Basic principles of quality control
- Statistical aspects of tolerance
- Basic concepts of probability
- Frequency distribution
- Sampling inspection
- Inspection related charts and gauges

Manufacturing IV (Scheduling)

- Scheduling production operations
- Analyzing production operations
- Improving production operations
- Applications of CPM scheduling
- Introduction of PERT

Special Problems

- Individual projects/internships

Electronics Technology

In addition to the **General Requirements** of:

Microeconomics
Freshman Composition
Fundamentals of Public Speaking
Engineering Drawing I
Metal Fabrication
Algebra
Pre-Calculus or Elem. Applied Math
Intro to Calculus or Analytical Geometry and Calculus
Introduction to Physics I and II
General Psychology

The **Technical Requirements** are:

Basic Electronics

- Introductory knowledge of electricity and solid state electronics
- Basic electronic terms, units, symbols, schematics, and code.
- Fundamentals of alternating current and direct current electricity
- Ohm's Law applied to a series and parallel networks
- Inductance and capacitance theory
- Test equipment used for troubleshooting
- Fundamentals of solid state theory and application
- Operating characteristics of diodes, transistors and I.C.s
- Introduction to computers and microprocessors

AC and DC Circuit Analysis

- AC and DC electrical circuits
- Application of network theorems to circuits containing resistors
- Application of network theorems to circuits containing capacitors
- Application of network theorems to circuits containing inductors
- Application of network theorems to circuits containing transformers

Industrial Electronics

- Operating characteristics and circuit analysis of solid state devices
- Transistor amplifiers
- Bias
- Impedance matching
- Operation and integrated circuit theory

Digital Electronics

- Pulse and digital circuits
- Wave shaping
- Switching circuits

- Trigger circuits
- Nonsinusoidal oscillators
- Sequencing systems
- Digital concepts
- Boolean algebra
- Logic circuits
- Memory circuits
- Arithmetic unit
- Logic applications

Electrical Motors, Control Circuits, and Computers
- Industrial power rotating machines
- Computer control
- Motor principles
- Motor classification
- Motor application
- Motor control circuits – single phase, 3-phase systems
- Relays
- Overload protection

Programmable Controllers, Instrumentation and Process Control I
- Transducers principles
- Controller principles
- Instrumentation
- Programmable controllers
- Analog and digital control of manufacturing process

Programmable Controllers, Instrumentation and Process Control II
- Process control

Microprocessor and Computer Basics I
- Computer organization and design
- ROMs
- RAMs
- Microprocessors
- Instructions sets
- Hardware
- Software
- Machine and assembly language programming

Microprocessor and Computer Basics II
- Computer interfacing

Data Communications and Computers
- Telecommunications
- Modems
- Amplifiers
- Local area networks (LAN)
- Communication standards and protocols
- Principles of radio, TV, telephone and digital networks

Personal Computer Maintenance
- Repair and troubleshooting of IBM PC
- Specifications
- Documentation
- Timing diagrams
- Diagnostic programs
- Test instruments
- Logic analyzers
- In-circuit emulation

Elect. Trouble Shooting and Repair
- Test equipment applications
- Repair of consumer analog equipment
- Repair of industrial analog equipment

HEART OF OHIO TECH PREP CONSORTIUM

1997

Engineering Technologies Core Model

PART V.
Secondary Academic
Advisory/Review Committee Members

HEART OF OHIO TECH PREP CONSORTIUM

Engineering Technologies Core Program Participant List

Business Participants

American Electric Power
Lancaster, OH

Ameritech
Worthington, OH

Anchor Hocking
Packaging
Lancaster, OH

Anchor Hocking Plant #1
Lancaster, OH

Andrews/Baker, Inc.
Worthington, OH

Applied Innovation
Dublin, OH

ATS Ohio
Westerville, OH

Automobile Finishing
Training Center
Worthington, OH

Bailey Corporation
Lancaster, OH

BBC&M Engineering
Dublin, OH

Bryden Engineering
Columbus, OH

Bulford Associates
Worthington, OH

C M Printing
Columbus, OH

Central Ohio Welding
Columbus, OH

Cheyl & Company
Westerville, OH

City Engineer
Lancaster, OH

Clyde E. Williams Assoc.
Worthington, OH

Columbis Gas of Ohio
Westerville, OH

Cordage of Columbus
Columbus, OH

Cowan & Associates
Worthington, OH

Design Group Architechts
Worthington, OH

Diamond Electronics
Lancaster, OH

Dodson-Stilson Inc.
Columbus, OH

Dupler Segna Inc.
Worthington, OH

Electro-Tenna
Westerville, OH

ElectroSonics
Columbus, OH

Fifth Avenue Lumber
Columbus, OH

Franklin International
Columbus, OH

Gene Kness
Lancaster, OH

Gogate Anand Engineers
Powell, OH

J&M Screw Products, Inc.
Carroll, OH

J. F. Hopkins & Assoc.
Columbus, OH

Korda/Smith
Columbus, OH

Lake Shore Cryotonics
Westerville, OH

Lancaster Electro-Plating
Lancaster, OH

Lancaster Glass
Lancaster, OH

Liebert Corp.
Columbus, OH

M & P Construction
Columbus, OH

McDonald Cassell &
Bassett
Columbus, OH

Mettler Toledo
Worthington, OH

Mid-West Fabricating
Amanda, OH

Miles-McClelland
Dublin, OH

Murphy Company
Columbus, OH

NaCom
Columbus, OH

National Meter Parts
Lancaster, OH

Nitschke Sampson Dietz
Columbus, OH

NE Ohio Natural Gas
Lancaster, OH

Pomery & Associates, Inc.
Worthington, OH

Pony-X-Press
Reynoldsburg, OH

PPG Industries Inc.
Circleville, OH

Ralston Foods
Lancaster, OH

Relcon Inc.
Westerville, OH

Robert Weiler Co.
Columbus, OH

Romanoff Electric
Columbus, OH

Ross Laboratory
Columbus, OH

Ryan International Corp.
Columbus, OH

S.E.A.
Worthington, OH

Schlumberger Automated
Worthington, OH

Sensotec, Inc.
Columbus, OH

Siego Engineering
Lancaster, OH

Solar Testing, Inc.
Columbus, OH

Solid State Controls
Worthington, OH

Engineering Technologies Core Program Participant List (Page 2)

Business (Continued)

South Central Power Co.
Lancaster, OH

Sticklen-Belsheim
Columbus, OH

Technical Support Svcs.
Worthington, OH

Sherman R. Smoot Co.
Columbus, OH

Timken Company
Columbus, OH

URS Consultants
Columbus, OH

Wendell & Schnell
Architects, Inc.
Columbus, OH

Westerman Inc.
Bremen, OH

Worthington Cylinders
Westerville, OH

Worthington Industries
Worthington, OH

Education Participants

Columbus State
Community College
Columbus, OH

Delaware Joint Vocational
School District
Delaware, OH

Eastland Career Center
Groveport, OH

Lancaster High School
Lancaster, OH

Ohio University-Lancaster
Lancaster, OH

Pickaway-Ross JVS
Chillicothe, OH

Westerville North &
South High Schools
Westerville, OH

Thomas Worthington
High School
Worthington, OH

HEART OF OHIO TECH PREP CONSORTIUM
1997

Engineering Technologies Core Model

PART VI.
Program Application

TECH PREP PROGRAM APPLICATION

Tech Prep Consortium Heart of Ohio Tech Prep Consortium Date 1997/8

Proposed Tech Prep Program Engineering Technologies Core Model (revised)

1. Provide labor market information substantiating employment opportunities in your area.

Original program development approved per FY 1992 proposal for operating funds, with revisions approved in FY 1996 proposal. Labor market data included the following excerpt from the Ohio Bureau of Employment Services, 1991-2000 Labor Market Projections:

OCCUPATIONAL AREA	ANNUAL RATE OF CHANGE (%		TOTAL ANNUAL OPENINGS	
	OHIO	SDA 16	OHIO	SDA 16
Civil Engineering Technology				
Civil Construction Manager	1.5	1.9	128	26
Surveyor	1.0	1.3	38	8
Drafter	1.1	1.5	769	128
Construction Management Technology				
Construction Manager	0.8	0.7	119	29

2. List the potential associate degree/apprenticeship exit occupations for this Tech Prep program.

See Attachment A.

3. List the potential high school exit occupations for this Tech Prep program.

See Attachment B.

4. Describe your consortium's plan for delivery of this Tech Prep program.

The Consortium has discontinued its original Engineering Technologies model developed in FY 1992. The former model was found to be too narrow in scope for Consortium needs.

The current model, the Engineering Technologies Core Model, was developed to replace the original model. In grade 11, it provides students with a very full year of foundational technical competencies that are essential for any career area in the engineering technologies, while also enabling students to explore the range of careers in the engineering technology cluster and make a more informed decision about a specific career direction. In grade 12, students choose a more focused career major and learn competencies that are specific to that more focused field. Currently, six career majors are available in grade 12. Seniors may attain the competencies for their chosen career major as follows: (1) learn them in a high school lab, if their school offers that particular career major in grade 12; (2) cross district boundaries to attend another Consortium school offering that particular career major; (3) take the equivalent college coursework through PSEO; (4) work with their district's School to Work staff to identify a worksite placement that will deliver the career major competencies; or (5) some combination of the above.

Both Columbus State Community College and Ohio University-Lancaster offer a variety of college Tech Prep pathways that enable the Tech Prep Engineering Technologies student to complete the full technical program (including advanced skills) in an engineering technology field of their choice.

The following school began this model in grade 11 in school year 1997-98: Pickaway-Ross JVS (with a Manufacturing focus). Lancaster High School will begin the program in Fall 1998. Eastland Career Center no longer offers the original Tech Prep Engineering Technologies program, but is considering offering the new Engineering Technologies Core model in Fall 1998 or 1999.

The Consortium has distributed copies of the program model to all partner schools and colleges. Schools that currently do not offer the model have been encouraged to consider doing so. The model will be reviewed annually at the local level, and every three years at the Consortium level.

Heart of Ohio Tech Prep Consortium

ENGINEERING TECHNOLOGIES CORE MODEL, 1997/98

ATTACHMENT A:
POTENTIAL ASSOCIATE DEGREE/APPRENTICESHIP EXIT OCCUPATIONS

ARCHITECTURE TECHNOLOGY - Construction, Landscape, & Surveying Emphases

- Computer-Aided Design/Drafter
- Facilities Management Technician
- Materials & Equipment Marketing & Sales
- Materials Technician
- Landscape Designer
- Surveying Technician/Construction Layout

CIVIL ENGINEERING TECHNOLOGY

- Assistant Construction Superintendent
- Computer-Aided Design/Drafter
- Construction Quality Control Technician
- Construction Field Engineer
- Construction Estimator
- Facilities Management Technician
- Materials Technician
- Surveying Technician/Construction Layout

CONSTRUCTION MANAGEMENT TECHNOLOGY

- Assistant Construction Project Manager
- Assistant Construction Superintendent
- Construction Estimator
- Construction Field Engineer
- Construction Quality Control Technician
- Construction Scheduler
- Facilities Management Technician
- HVAC Equipment Application Technician
- Materials Technician
- Materials & Equipment Marketing & Sales
- Surveying Technician/Construction Layout

DESIGN INDUSTRIAL TECHNOLOGY - Civil & Mechanical Options

- Civil Engineering Technology Design
- Computer Aided Designer/Drafter
- Mechanical Engineering Technology Design

ELECTRONICS TECHNOLOGY

- Assistant Manufacturing Engineering
- Avionics Technician/Supervisor
- Computer Maintenance Technician
- Electronics Service Technician
- Electrical Technologist
- Engineering Technician
- Field Service Engineer
- Industrial Maintenance Technician
- Instrumentation Technician
- Junior Engineer
- Product Technical Specialist
- Salesperson
- Test Technician

GRAPHIC COMMUNICATIONS

- Composition Assistant
- Computer Graphics Illustrator
- Photoengraver
- Photographer
- Printing Estimator
- Production Artist
- Typesetter

LANDSCAPE DESIGN/BUILD MAJOR

- Arboriculture Crew Member
- Botanic Garden Manager
- Estate Grounds Manager
- Facilities Management Technician
- Irrigation Specialist
- Landscape Design Contractor
- Landscape Foreman
- Merchandiser
- Whole/Retail Nursery Manager

MANUFACTURING

- CAD Operator
- Drafter-Designer
- Electronics Service Technician
- Industrial Engineering Technician
- Industrial Supervisor
- Machine Designer
- Machine Programmer
- Machine Shop Supervisor
- Maintenance Technician/Supervisor
- Material Technologist
- Mechanical Engineering Technician
- Production Engineering Technician
- Production Scheduler
- Quality Controller
- Quality Machine Designer
- Robotics Technician
- Test Technician

Heart of Ohio Tech Prep Consortium

ENGINEERING TECHNOLOGIES CORE MODEL, 1997/98

ATTACHMENT B:
POTENTIAL HIGH SCHOOL EXIT OCCUPATIONS

ARCHITECTURE TECHNOLOGY - Construction, Landscape, & Surveying Emphases
- Construction Clerk
- Construction Laborer
- Entry-level CAD Drafter
- Entry-level Materials Technician
- Survey Crew Rod-person

CIVIL ENGINEERING TECHNOLOGY
- Same as Architecture Technology

CONSTRUCTION MANAGEMENT TECHNOLOGY
- Same as Architecture Technology

ELECTRONICS TECHNOLOGY
- Component Assembler
- Electronics Technician
- Salesperson

GRAPHIC COMMUNICATIONS
- Assistant Photographer
- Beginning Drafter
- CAD Operator
- Drafting Technician

LANDSCAPE DESIGN/BUILD MAJOR
- Beginning Drafter
- CAD Operator
- Drafting Technician
- Landscape Crew Member

MANUFACTURING
- Assembly Technician
- Beginning Drafter
- CAD Operator
- Drafting Technician
- Electrical/Electronic Assembler
- Entry-Level Machinist
- Machine Operator
- Maintenance Repairer
- Materials Handler
- Precision Assembler
- Production Expediting Clerk

TABLE 1
DEMOGRAPHICS FOR THE CENTRAL OHIO TECH-PREP CONSORTIUM SERVICE DELIVERY AREAS

SDA	Total Population (1990)	Population by Age Group		Income Per Capita (1990)	Students in Public Schools (1990-91)	
		Age 15-24	Age 25-64		All Students (K-12)	Students in Gen. Education*
SDA 11 (Madison, Union, etc.)	385,590	51,600	197,190	$16,519	71,044	8,137
SDA 15 (Delaware, etc.)	324,240	34,520	163,290	$15,090	57,751	6,688
SDA 16 (Franklin Co.)	945,720	166,570	489,260	$20,003	147,848	15,714
SDA 17 (Fairfield, Pickaway, & Ross, etc.)	281,220	35,050	145,790	$14,544	53,233	6,800
TOTAL	1,936,770	287,740	995,530	$16,539 (avg.)	329,886	37,339

Sources: Woods & Poole, 1990 State Profile - Ohio; Ohio Educational Directory 1990-91

**Calculations based on 40% of high school students – the % of general education given in Hull & Parnell, Tech Prep Associate Degree (1991), p. 41.*

TABLE 2
SDA 11, 15, 16, AND 17 ENGINEERING TECHNOLOGY EMPLOYMENT PROJECTIONS (SELECTED OCCUPATIONS), 1988-2000

Technical Occupations	1988 Annual Employment	2000 Projected Employment	Change in Employment 1988-2000	Percent Change 1988-2000	Total Annual Openings
Engineering Technicians	6,770	7,950	1,180	17.4%	254
Civil Engineering Technicians	480	610	130	27.1%	26
Electrical/Electronic Technicians	1,730	2,250	520	30.1%	71
Heating, A/C, Refrig. Mechanics	2,190	2,530	340	15.5%	250
All Other Engineering Technicians	1,400	1,750	350	25.0%	73

Sources: Ohio Labor Market Information, Labor Market Projections 1988-2000

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